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SELECTED WATER RESOURCES ABSTRACTS

VOLUME 11, NUMBER 4
FEBRUARY 15, 1978

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SELECTED WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 11, NUMBER 4
FEBRUARY 15, 1978

W78-01184 -- W78-01700

The Secretary of the U.S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into 10 fields and 60 groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on the inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, DC 20240

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01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

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Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
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08 ENGINEERING WORKS
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10 SCIENTIFIC AND TECHNICAL INFORMATION
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ACCESSION NUMBER INDEX

ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

2. WATER CYCLE

2A. General

SIMPLIFICATIONS OF WATERSHED GEOMETRY AFFECTING SIMULATION OF SURFACE RUNOFF,
Agricultural Research Service, Tucson, AZ. Southwest Watershed Research Center.
L. J. Lane, and D. A. Woolhiser.
Journal of Hydrology, Vol. 35, No. 1/2, p 173-190, October 1977. 6 fig, 23 ref.

Descriptors: *Watersheds(Basins), *Hydrographs, *Runoff, *Model studies, Mathematical models, Flow, Channels, Surface runoff, Surface drainage, Surface waters, Precipitation(Atmospheric), Rainfall, Topography, Drainage, Hydrology.
Identifiers: *Watershed geometry, Simplifications.

In formulating the equations describing the flow of water on the surface of a watershed, geometric simplifications must be made. A geometric simplification is the substitution of a simple geometry for a more complex one. The problem is to examine techniques for and consequences of such simplifications, and thereby to develop objective procedures for geometric simplification of complex watersheds. Watershed geometry was represented by a series of planes and channels in cascade. When overland flow and open channel flow in the cascade were described by the kinematic wave equations, the resulting mathematical model was called the kinematic cascade model. Planes were fitted to coordinate data from topographic maps by a least-square procedure. Residuals of the fit formed a geometric goodness-of-fit statistic as the improvement over using the mean elevation. An overall goodness-of-fit statistic was the drainage density ratio, the ratio of drainage density in the cascade of planes and channels to drainage density of the watershed. Given rainfall, runoff, and topographic data for a small watershed, it is possible to define the simplest kinematic cascade geometry which when used in simulation will preserve selected hydrograph characteristics to a given degree of accuracy. (Sims-ISWS)
W78-01290

EVALUATING COMPONENTS OF THE USDAHL HYDROLOGY MODEL APPLIED TO GRASSLAND WATERSHEDS,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
F. R. Crow, W. O. Ree, S. B. Loesch, and M. D. Paine.
Transactions of the American Society of Agricultural Engineers, Vol. 20, No. 4, p 692-696, July-August 1977. 5 fig, 4 tab, 5 ref.

Descriptors: *Runoff, *Model studies, *Grasslands, *Oklahoma, Watersheds(Basins), Grazing, Evapotranspiration, Hydrology, Monthly, Surface runoff.
Identifiers: Grassland watersheds, USDAHL model.

The USDAHL-74 Model of Hydrology was applied to a 37 ha watershed in central Oklahoma. During the calibration years of 1970-1972, simulated monthly runoff agreed closely with measured runoff. A single independent test for the years 1956-1959, using watershed parameters tested during the calibration phase, confirmed the good correlation between simulated and measured monthly runoff. A method was presented which shows how the watershed hydrologic cover condition can be used to determine the grazing parameter, Percent Reduction in ET Due to Grazing. (Lee-ISWS)
W78-01297

SIMULATION OF THE TROPICAL CLIMATE OF AN ICE AGE,
National Oceanic and Atmospheric Administration, Princeton, NJ. Geophysical Fluid Dynamics Lab.
S. Manabe, and D. G. Hahn.
Journal of Geophysical Research, Vol 82, No 27, p 3889-3911, September 20, 1977. 28 fig, 3 tab, 36 ref, 3 append.

Descriptors: *Paleoclimatology, *Tropical regions, *Model studies, Mathematical models, Circulation, Air circulation, Ocean circulation, Precipitation(Atmospheric), Albedo, Evaporation, Runoff, Hydrologic cycle, Deserts, Dunes, Arid lands, Temperature, Water temperature, Climatology, Meteorology.
Identifiers: *Ice age.

Numerical time integrations of general circulation model of the atmosphere were performed with both modern and ice age boundary conditions. It was shown that the climate of continental portions of the tropics in the ice age simulation was much drier than that of the modern climate simulation. According to comparisons of results from the two experiments, tropical continental aridity of the ice age resulted from stronger surface outflow from (or weaker surface inflow into) continents. The intensification of outflow from (or weakening of inflow into) tropical continental regions resulted from the fact that in response to ice age boundary conditions, atmospheric temperature was reduced more over continents than over oceans. With the exception of high latitudes, boundary condition differences between the two experiments consisted mainly of changes of the prescribed values of sea surface temperature and continental albedo. In order to evaluate the relative contributions of these changes in producing continental tropical aridity in the ice age simulation, third numerical experiment was time-integrated in which a hybrid combination of ice age sea surface temperatures and modern continental albedo values were prescribed. From intercomparisons between results from this and the previous two experiments, it was shown that the effect of increased continental albedo was mainly responsible for the weak Asian monsoon in the ice age simulation. (Sims-ISWS)
W78-01304

2B. Precipitation

HEAVY RAINFALL RELATIONS OVER CHICAGO AND NORTHEASTERN ILLINOIS,
Illinois State Water Survey, Urbana.
J. L. Vogel, and F. A. Huff.
Water Resources Bulletin, Vol. 13, No. 5, p 959-971, October 1977. 5 fig, 2 tab, 17 ref. NSF ENV76-01447.

Descriptors: *Rainfall, *Precipitation excess, *Precipitation intensity, *Illinois, Cities, Weather, Lakes, Effects, Weather modification, Distribution patterns, Precipitation(Atmospheric), Frequency analysis, Analytical techniques, Temporal distribution, Spatial distribution, Storms, Storm runoff, Climatology, Meteorology.
Identifiers: *Chicago(Ill), *Northeast Illinois, Heavy rainstorms.

Detailed studies of rainfall frequency and pattern relations were made over the Chicago urban region and the surrounding six Illinois counties (Cook, DuPage, Kane, Will, Lake, and McHenry). The studies utilized rain gauge records from an urban network of National Weather Service rain gauges in the region, primarily for the period 1949 to 1974. Frequency distributions of point rainfall were obtained for periods from 5 min to 72 h and recurrence intervals of 6 months to 50 years. The results indicated a spatial pattern of short-duration, heavy rainfall frequencies related to urban-lake effects, particularly in the huge industrial region over the southern portion of Chicago. The time distribution within heavy rainstorms over the urban region were similar to a 12-year sample of a dense rain gauge network over a rural area in central Illinois. The characteristics of heavy rainfall over northeast Illinois also were studied through the use of heavy, 1-day storms. A total of 87 storms, capable of producing local flooding, were analyzed to determine: (1) the frequency distribution of storm centers, (2) seasonal and diurnal distribution of storms, and (3) orientation and movement of storms. (Sims-ISWS)
W78-01292

RUNOFF FREQUENCY FROM SMALL STORMS AND IMPLICATIONS FOR WATER QUALITY,
Agricultural Research Service, Durant, OK. Water Quality Management Lab.
For primary bibliographic entry see Field 2E.
W78-01294

SIMULATION OF THE TROPICAL CLIMATE OF AN ICE AGE,
National Oceanic and Atmospheric Administration, Princeton, NJ. Geophysical Fluid Dynamics Lab.
For primary bibliographic entry see Field 2A.
W78-01304

RAINFALL INFILTRATION INTO BARE SOILS,
Ministry of Agriculture, Tel-Aviv (Israel). Soil Conservation and Drainage Div.
For primary bibliographic entry see Field 2G.
W78-01306

RESPONSE OF THE COASTAL BOUNDARY LAYER ON THE NORTH SHORE OF LAKE ONTARIO TO A FALL STORM,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 2H.
W78-01309

PRELIMINARY TESTS OF A CUMULUS CLOUD SEEDING TECHNIQUE,
Atmospheric Environment Service, Downsview (Ontario).
For primary bibliographic entry see Field 3B.
W78-01310

ADJUSTMENT TO QUATERNARY CLIMATIC CHANGE BY THE COLORADO RIVER IN CENTRAL TEXAS,
Texas Univ. at Austin. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2E.
W78-01504

AN ANALYSIS OF A POSSIBLE CROP RESPONSE TO HAIL SUPPRESSION SEEDING: THE NELSPRUIT HAIL SUPPRESSION PROJECT,
Cansas International Corporation, Nelspruit (South Africa).
For primary bibliographic entry see Field 3B.
W78-01619

INTERPRETATION OF FOIL IMPACTOR IMPRESSIONS OF WATER AND ICE PARTICLES,
National Center for Atmospheric Research, Boulder, CO.
C. A. Knight, N. C. Knight, W. W. Grotewold, and T. W. Cannon.
Journal of Applied Meteorology, Vol. 16, No. 9, p 997-1002, September 1977. 3 fig, 12 ref.

Descriptors: *Cloud physics, *Instrumentation, *Laboratory tests, Particle size, Particle shape, Ice, Rain, Drops(Fluids), Graupel, Equipment, Precipitation(Atmospheric), Rainfall, Hail, Meteorology.
Identifiers: *Foil impactors.

Impacts of hydrometeors on aluminum foil over a grooved backing, as in standard airborne foil impactors, were produced in the laboratory using a modified crossbow to achieve aircraft speeds. The purpose of the work was to test the ability to distinguish the phase of the hydrometeors from the nature of the imprints at sizes below about 3 mm diameter, solid, spherical ice pellets (frozen drops) and drops of slush leave impressions that are often indistinguishable from those left by liquid drops. (Sims-ISWS)
W78-01620

RADAR-DERIVED STATISTICS ON THE STRUCTURE OF PRECIPITATION PATTERNS,
Consiglio Nazionale delle Ricerche, Milan (Italy). Centro Telecomunicazioni Spaziali.
G. Drufuca.
Journal of Applied Meteorology, Vol. 16, No. 10, p 1029-1035, October 1977. 11 fig, 3 tab, 7 ref.

Descriptors: *Precipitation(Atmospheric), *Distribution patterns, *Radar, Rainfall, Statistics, Probability, Weather patterns, Storms, Spatial distributions, Rainfall intensity, Weather, Meteorology.

A large sample of low-elevation weather radar data was analyzed to give information about the spatial structure of precipitation patterns. The quantities considered were rainfall rate distributions as a function of the area mean and maximum rates, joint rainfall rate distributions for pairs of points, and the cellular structure of the patterns. (Sims-ISWS)
W78-01621

THE MICROSTRUCTURE OF CALIFORNIA COASTAL FOG AND STRATUS,
San Jose State Univ., CA. Dept. of Meteorology.
J. Goodman.
Journal of Applied Meteorology, Vol. 16, No. 10, p 1056-1067, October 1977. 11 fig, 3 tab, 24 ref. NSF GA-42464.

Descriptors: *Fog, *Clouds, *California, Coasts, Drizzle, Precipitation(Atmospheric), Cloud physics, Winds, Drops(Fluid), On-site investigations, On-site data collections, Towers, Weather, Meteorology.
Identifiers: *Stratus.

Detailed vertical profiles of the microphysical properties of West Coast advection fog were made over the San Francisco peninsula during the summers of 1974 and 1975. The sampling platform was the 250 m high Mount Sutro tower which, during much of the summer, protrudes through the coastal marine layer into the subsidence inversion. The microphysical structure was found to vary systematically as a function of air parcel trajectory and air mass history. Maritime trajectories had an average droplet concentration of 89/cu cm, contrasting sharply with continental trajectories averaging 265/cu cm. The effect of nuclei depletion due to washout processes as the air parcels travel through stratus decks was found to reduce the number of nuclei available for condensation by as much as 30%. Despite large variations in their initial structure, each sample displayed a remarkable consistency in its microphysical development. Over the peninsula, the mean droplet diameter and liquid water content increased with height in every case. Without exception, broader drop size distributions were observed near the inversion interface; the distribution also broadened throughout the entire layer during the onshore portion of the fog history. In all cases, drizzle drops formed in the uppermost portions of the stratus layer which precipitated downward with time. (Sims-ISWS)
W78-01622

ON THE ACCELERATION OF LARGE WATER DROPS TO TERMINAL VELOCITY,
Illinois Univ. at Urbana-Champaign. Lab. for Atmospheric Research; and Illinois State Water Survey, Urbana.
K. V. Beard.
Journal of Applied Meteorology, Vol. 16, No. 10, p 1068-1071, October 1977. 3 fig, 12 ref, 1 append. NSF ATM75-20066.

Descriptors: *Drops(Fluid), *Velocity, *Model studies, Mathematical models, Drag, Settling velocity, Cloud physics, Rain, Meteorology.
Identifiers: *Terminal velocity, Acceleration, Water drops, Water drop acceleration.

A theory based on the distortion of large water drops was used to calculate the drag and acceleration of drops in the laboratory from rest to terminal velocity. The results showed that the drag coefficient curve for each drop size lies between the curves for a sphere and for water drops at terminal velocity. A comparison with experimental acceleration data at sea level showed an improvement over the more approximate theory of Wang and Pruppacher. The calculations of drops accelerating at reduced air density provided a very good fit to the data of Davies at the reported fall distance of 11 m. The new interpretation of Davies' experiment is consistent with the formula of Beard for the teminal velocity of large drops aloft. (Sims-ISWS)
W78-01623

EFFECTIVE RAINFALL IN IRRIGATED AGRICULTURE,
Indian Agricultural Research Inst., New Delhi.
N. G. Dastane.
Irrigation and Drainage Paper 25, Food and Agriculture Organization of the United Nations, Rome (Italy), 1974. 67 p, 11 fig, 15 tab, 61 ref.

Descriptors: *Effective precipitation, *Irrigation, *Agriculture, Precipitation(Atmospheric), *Rainfall, Evaporation, Evapotranspiration, Soil moisture, Soil water, Infiltration, Groundwater, Drainage, Precipitation excess, Runoff, Storm runoff, Farm management, Crops, Lysimeters, Meteorology, Soil properties.

In view of the vital importance of water in man's life, precise knowledge of not only total rainfall but also of the utilizable or effective part of rainfall is essential for the economic and efficient planning of water resources. This paper presents a number of concepts of effective rainfall currently in use. A distinction was made between effective rainfall and the effectiveness of rainfall, being two different entities. The definition of effective rainfall was examined, and a modified concept of effective rainfall was proposed for use in irrigated agriculture. A brief history as well as the criteria for the assessment and factors influencing effective rainfall were presented. In addition, methods of measuring effective rainfall and its different components, as well as merits and limitations of each of these methods, were discussed. Also, the application of derived data on effective rainfall, together with several calculations and reference, was given for guidance in developing and using the information in planning as well as in practice of water management. Finally, a number of practices to increase effective rainfall were listed. (Sims-ISWS)
W78-01642

A MODEL OF STOCHASTIC STRUCTURE OF DAILY PRECIPITATION OVER AND AN AREA,
Agricultural Research Service, Temple, TX. Blackland Conservation Research Center.
C. . Richardson.
Hydrology Papers No 91, Colorado State University, Fort Collins, July 1977. 54 p, 40 fig, 33 tab, 35 ref.

Descriptors: *Precipitation(Atmospheric), *Model studies, *Mathematical models, Stochastic processes, Daily, Spatial distribution, Probability, Mathematics, Statistics, Fourier analysis, Correlation analysis, Rainfall, Hydrology.

Daily precipitation over an area was studied by modeling the stochastic structure of the time-area daily precipitation process. Daily precipitation at a point was envisioned as a continuous random variable that has been truncated at zero. The zero daily precipitation amounts were considered negative amounts of unknown quantity. The square roots of daily precipitation at a point for a selected study region approximated a sample from a truncated univariate normal distribution. The multivariate normal distribution was used to describe the time-area variation of daily precipitation over an area. The means and standard deviations of the normalized precipitation are periodic within the year. A method was developed for obtaining maximum likelihood estimates of daily means and standard deviations from the truncated samples. The periodic components of the means and standard deviations were described with Fourier series. The Fourier coefficients were related to position within the study region. Sequences of random components were obtained for each station in the study region by removing the periodic means and standard deviations. The sequences of random components were distributed normally with zero means and unity standard deviations and were dependent in time and space. The lag-one autocorrelation coefficients were found to approximate a regional constant. The lag-zero cross-correlation coefficients were found to be a function of interstation distance. Precipitation sequences were generated for 2 areas in the study region using the truncated multivariate normal distribution model. (Sims-ISWS)
W78-01643

RAINFALL ANALYSIS FOR DRAINAGE DESIGN, VOLUME I, SHORT-DURATION PRECIPITATION FREQUENCY,
California State Dept. of Water Resources, Sacramento.
J. D. Goodridge.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-265 000, Price codes: A99 in paper copy, A01 in microfiche. Report FHWA-CA-76-195, October 1976. 678 p, 21 fig, 1 tab, 29 ref.

Descriptors: *Precipitation(Atmospheric), *Frequency analysis, *California, *Rainfall, Snowfall, Runoff, *Drainage, *Depth-area-duration analysis, Data collections, Probable maximum precipitation, Design flood, Precipitation intensity, Weather data, Rain gages, Measurement, Data processing, Spatial distribution, Temporal distribution, Hydrology, Meteorology.
Identifiers: Return periods, Short-duration precipitation.

This report was an analysis of depth-duration-frequency of precipitation in California and contained the annual series extreme values from about 30 rain gage networks in California. A statistical analysis of each record is available, giving 12 return periods ranging from 2 to 10,000 years and durations of 5 min to 60 days, including annual total precipitation. Methods of interstation interpolation were given. Hourly precipitation records of the National Weather Service were reevaluated to develop 5-, 10-, 15-, and 30- min extreme data. This volume reported precipitation, depth-duration-frequency data, and analysis from 600 recording rain gages with durations ranging from 5 min to 24 h. The data contained were intended for use in runoff computation using procedures such as the rational method or the unit hydrograph method. A cooperative compute data bank was developed to

store data on rainfall extremes and to analyzed data periodically, as well as to maintain a continuous file for future use by cooperators. (See also W78-01649 and W78-01650) (Sims-ISWS)
W78-01648

RAINFALL ANALYSIS FOR DRAINAGE DESIGN, VOLUME II, LONG-DURATION PRECIPITATION DATA,
California State Dept. of Water Resources, Sacramento.
J. D. Goodridge.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-265 001, Price codes: A17 in paper copy, A01 in microfiche. Report FHWA-CA-76-195, October 1976. 386 p, 16 fig, 4 tab, 15 ref.

Descriptors: *Precipitation(Atmospheric), *Frequency analysis, *California, *Rainfall, Snowfall, Runoff, *Drainage, *Depth-area-duration analysis, Data collections, Weather data, Probable maximum precipitation, Design flood, *Precipitation intensity, Rain gages, Measurement, Data processing, Spatial distribution, Temporal distribution, Hydrology, Meteorology.
Identifiers: Return periods, Long-duration precipitation.

This report was an analysis of depth-duration-frequency of precipitation in California and contained the annual series extreme values from about 30 rain gage networks in California. A statistical analysis of each record is available, giving 12 return periods ranging from 2 to 10,000 years and durations of 5 min to 60 days, including the annual total precipitation. Methods of interstation interpolation were given. Hourly precipitation records of the National Weather Service were reevaluated to develop 5-, 10-, 15-, and 30- min extreme data. This volume reported depth-duration-frequency analysis of precipitation with durations of one day to 60 days from 900 nonrecording rain gages. The data contained in this report were intended for use in runoff computation using procedures such as the rational method or the unit hydrograph method. A cooperative computer data bank was developed to store data on a rainfall extremes and to analyze data periodically, as well as to maintain a continuous file for future use by cooperators. (See also W78-01648 and W78-01650) (Sims-ISWS)
W78-01649

RAINFALL ANALYSIS FOR DRAINAGE DESIGN, VOLUME III, INTENSITY-DURATION-FREQUENCY CURVES,
California State Dept. of Water Resources, Sacramento.
J. D. Goodridge.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-265 002, Price codes: A14 in paper copy, A01 in microfiche. Report FHWA-CA-76-195, October 1976. 303 p, 7 fig, 1 tab.

Descriptors: *Precipitation(Atmospheric), *Frequency analysis, *California, *Duration curves, *Frequency curves, *Rainfall, Snowfall, Runoff, Drainage, *Depth-area-duration analysis, Weather data, Probable maximum precipitation, Design flood, Precipitation intensity, Data processing, Temporal distribution, Hydrology, Meteorology.
Identifiers: Return periods, Intensity-duration-frequency curves.

This report was an analysis of depth-duration-frequency of precipitation in California and contained the annual series extreme values from about 30 rain gage networks in California. A statistical analysis of each record is available, giving 12 return periods ranging from 2 to 10,000 years and durations of 5 min to 60 days, including the annual total precipitation. Methods of interstation interpolation were given. Hourly precipitation records of the National Weather Service were reevaluated to develop 5-, 10-, 15-, and 30-min extreme data. This volume contained precipitation intensity-duration-frequency curves from 500 recording rain gages, based on maximum annual rainfall depths for 5 to 180 minutes. The information contained in this report was intended for use in runoff computation using procedures such as the rational method or the unit hydrograph method. A cooperative computer data bank was developed to store data on rainfall extremes and to analyze data periodically, as well as to maintain a continuous file for future use by cooperators. (See also W78-01648 and W78-01649) (Sims-ISWS)
W78-01650

A COMPARISON OF OCEANIC PRECIPITATION AS MEASURED BY GAGE AND ASSESSED FROM WEATHER REPORTS,
National Oceanic Atmospheric Administration, Seattle, WA. Pacific Marine Environmental Lab.
R. K. Reed, and W. P. Elliott.
Journal of Applied Meteorology, Vol. 16, No. 9, p 983-986, September 1977. 1 tab, 8 ref.

Descriptors: *Precipitation(Atmospheric), *Oceans, Ships, *Rain gages, *Pacific Ocean, *Measurement, Rainfall, Data processing, Weather, Oceanography, Meteorology.
Identifiers: Rainfall estimates, Shipboard rain gages.

The problems of using rain gages on ships were discussed, and methods of estimating rainfall from weather reports at sea were reviewed, with emphasis on discussion of efforts to verify the assessments derived by Tucker. A rain gage was used on cruises of the NOAA ship Oceanographer in the eastern Pacific during 1975 and 1976, and rainfall was estimated from weather reports using Tucker's assessments. In extratropical latitudes (mainly 40-60 deg N), a catch of 35 cm was obtained; estimates from the weather reports gave a value of 31 cm. Thus, Tucker's assessments essentially are in agreement with catches from a small gage in this region. In the tropics, however, the agreement was not good. Almost 3 times as much rain was caught as was estimated; hence, Tucker's coefficients will need to be reevaluated for this area. (Sims-ISWS)
W78-01656

2C. Snow, Ice, and Frost

WORLD DATA CENTER A: GLACIOLOGY.
Geological Survey, Tacoma, WA. Water Resources Div.
For primary bibliographic entry see Field 10C.
W78-01272

SIMULATION OF THE TROPICAL CLIMATE OF AN ICE AGE,
National Oceanic and Atmospheric Administration, Princeton, NJ. Geophysical Fluid Dynamics Lab.
For primary bibliographic entry see Field 2A.
W78-01304

INTERPRETATION OF FOIL IMPACTOR IMPRESSIONS OF WATER AND ICE PARTICLES,
National Center for Atmospheric Research, Boulder, CO.
For primary bibliographic entry see Field 2B.
W78-01620

ON A DIFFERENTIALLY HEATED SALT-WATER-ICE SYSTEM,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W78-01624

SURGE ACTIVITY ON THE BARNES ICE CAP,
Department of the Environment, Ottawa (Ontario). Water Resources Branch.
G. Holdsworth.
Nature, Vol. 269, No. 5629, p 588-590, October 13, 1977. 4 fig, 22 ref.

Descriptors: *Ice, *Canada, *Glaciology, Surges, Geomorphology, Topography, Lakes, Streams, Glacial drift, Movement, On-site investigations, Remote sensing, Satellites(Artificial), Glaciation.
Identifiers: *Baffin Island(Canada), *Barnes Ice Cap, Ice cap.

This report showed that several surges have occurred within the last millennium on the Barnes Ice Cap, a small subpolar ice sheet on Baffin Island, Canada. Surge scars on the ice cap have been identified tentatively, and one surge area subsequently was documented in some detail. Five distinct surge scars of different ages were identified with the help of Landsat imagery. The general features of the surge scars are: (1) The presence of third and occasionally fourth order meltwater channels. (2) Irregular foliation, defined by alternate dark- and light-banded ice, is developed near the margins and indicates the presence of large shear strains. (3) Lakes occur on the ice surface due to trapping of meltwater in local depressions. (4) Major streams, which flow west from the ice cap, can be traced to the major surge areas. (5) Moraines adjacent to the surge lobes tend to be well developed, particularly when the surge is recent, since the moraines initially contain a substantial ice core. (Humphreys-ISWS)
W78-01637

2D. Evaporation and Transpiration

EVAPORATION FROM SOLONCHAKS AND SALTWORT VEGETATION (IN RUSSIAN),
E. N. Minaeva.
Probl Osvo Pustyn' 1. 43-48. 1976.

Descriptors: *Evaporation, *Transpiration, Solonchak soils, *Soil water, Lysimeters, Solar radiation, Turkmen SSR.

Lysimetric and thermal balance studies were conducted on solonchaks in SE Turkmen SSR (USSR). Total evaporation from the soil during April-Oct. was 220 mm, 60% of which was due to transpiration by saltwort vegetation. In solonchaks without vegetation, yearly ground water evaporation was about 100 mm as a result of hydrophysical properties of the soils. Maximum evaporation levels were observed in the winter-spring period, while transpiration levels were highest in June-July. After the vegetation period, total evaporation values sharply decreased. The dense white surface layer of the solonchaks affected the radiation balance. Turbulent heat exchange with the atmosphere comprised 50% of the radiation balance, heat loss on evaporation comprised 30%, and heat exchange with the soil comprised 20%.--Copyright 1977, Biological Abstracts, Inc.
W78-01207

USE OF A MODIFIED BALNEY-CRIDDLE FORMULA TO CALCULATE THE IRRIGATION REQUIREMENTS OF WINTER WHEAT IN THE AREAS BETWEEN 16 DEGREES 30' EAST AND 30 DEGREES E., AND BETWEEN 27 DEGREES SOUTH AND 35 DEGREES S. (IN AFRIKAANS),
Navorsingsinstituut Grond Besproeiing, Pretoria (South Africa).
A. L. Du Pisani.
S Afr Dep Agric Tech Serv Tech Sommun 126: 1-43. 1975 (English summary).

Descriptors: *Irrigation, *Fourier analysis, *Evapotranspiration, Variability, Monthly, Seasonal, Precipitation(Atmospheric), Climatic zones, Temperature, Rainfall.
Identifiers: Balney, Criddle, Irrigation requirements, Orange River, South Africa.

A comparative study was made of the methods used to calculate the variation, in time, of the ratio of actual to calculated evapotranspiration (BEt) values. The best results were obtained by applying a Fourier series to values, calculated according to the formula of Balney and Criddle using maximum instead of average temperatures. BEt was calculated for the whole growing season for 160 climatological stations in the total area which includes the area to be served by the Orange River irrigation scheme (16 degrees 30' -30 degrees E and 27 degrees -35 degrees S). The irrigation requirement (BB) was calculated by subtracting the effective precipitation (EN) from BEt. EN was taken to be 50% of the total precipitation, except where this value was higher than BEt for the month concerned. In this case EN was then taken as equal to BEt. Maps were drawn for the whole area, depecting monthly and seasonal variation of both BEt and BB for each area. A short description of the various climatic zones found the area was given with the emphasis on monthly average daily maximum temperature and rainfall. The maps show that the seasonal total for BB ranges 400-500 mm for the greatest part of the area. It is <300 mm along certain parts of the coast and some upland, while it is >550 mm along a part of the lower Orange River between Kakamas and Goodhouse. For most inland areas which are to be served by the Orange River scheme, the value of BB is above average (>450 mm). Along the Bushmans and low Fish Rivers which are included in the Orange River Scheme, BB is quite low (approximately 399-350 mm).--Copyright 1977 Biological Abstracts, Inc.
W78-01342

ETHEPHON ADVANCES LOBLOLLY PINE NEEDLE CAST,
Forest Hydrology Lab. Oxford, MS.
C. G. Griffing, and S. J. Ursic.
Forest Science Vol 23 No 3, p 351-354. September 1977, 3 tab, 8 ref.

Descriptors: *Loblolly pine trees, Watershed management, Water balance, Gulf Coastal Plain, *Mississippi.
Identifiers: Pinus taeda L., 2-chloroethanephosphonic acid, *Ethylene, *Abscission, *Needle cast(Pine trees), Auxin.

Potted 1-0 loblolly pine seedlings sprayed with 5,000 ppm acid equivalents of ethephon in water in early July promptly abscised most of their year-old fascicles. Neither survival nor current-year needles were affected. The treatment reduced foliage during the summer-fall period of high potential water use. Quantification of possible reductions in water use under field conditions appears warranted. Application of ethephon in late June to 1-0 loblolly seedlings planted on droughty sandy soils also warrants study, since summer drought is the leading cause of first-year mortality on such sites. (Forest Service)
W78-01347

2E. Streamflow and Runoff

SIMPLIFICATIONS OF WATERSHED GEOMETRY AFFECTING SIMULATION OF SURFACE RUNOFF,
Agricultural Research Service, Tucson, AZ. Southwest Watershed Research Center.
For primary bibliographic entry see Field 2A.
W78-01290

RUNOFF FREQUENCY FROM SMALL STORMS AND IMPLICATIONS FOR WATER QUALITY,
Agricultural Research Service, Durant, OK. Water Quality Management Lab.
R. B. Lewis, V. L. Hauser, R. G. Menzel, and J. D. Ross.
Transactions of the American Society of Agricultural Engineers, Vol. 20, No. 4, p 661-665, July-August 1977. 8 fig, 4 tab, 10 ref.

Descriptors: *Runoff, *Nebraska, *Water quality, *Agricultural chemicals, On-site investigations, Watersheds(Basins), Agricultural watersheds, Agricultural runoff, Chemicals, Farm management, Contour farming, Crops, Field crops, Storms, Storm runoff, Precipitation(Atmosphere), Pollutants, Water pollution, Water pollution control.

The concentration of chemicals in surface runoff water is often an important consideration. Water soluble chemicals which are applied to the surface of plants or soil may appear in highest concentration in runoff from small storms. Therefore, some aspects of water quality management require quite different hydrologic information than has been required to solve problems considered in the past. The study of small storms in the central Great Plains near Hastings, Nebraska, revealed much about small storms and their relation to water quality. Compared with straight row cultivation, contouring of corn substantially decreased the number of runoff events resulting from small storms, and thus substantially decreased the probability of pollution from surface applied chemicals. The data showed that wheat on contour produced about 1/3 less annual runoff than wheat grown with straight row tillage; however, no difference was found between contour and straight row wheat in the number of runoff events resulting from small storms. During the months when it is desirable to top-dress nitrogen fertilizer on winter wheat, there is little or no threat of pollution to surface waters. Few runoff events were produced by small storms falling on meadow or pasture; therefore, chemicals may safely be applied to them. During June, the high rainfall month, there were 5 times more small storms producing no runoff than storms which did on all cultivated crops except corn with straight row tillage. Thus, if chemicals are applied only when the soil surface is relatively dry, the probability of surface-water pollution would be small. (Sims-ISWS)
W78-01294

EVALUATING COMPONENTS OF THE USDAHL HYDROLOGY MODEL APPLIED TO GRASSLAND WATERSHEDS,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2A.
W78-01297

BOUNDARY LAYER DEVELOPMENT IN OPEN WATER-CHANNEL,
Cambridge Univ. (England). Engineering Lab.
For primary bibliographic entry see Field 8B.
W78-01299

A LEAST SQUARES METHOD FOR COMPUTING STATISTICAL TOLERANCE LIMITS,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 7C.
W78-01307

PSYCHRORHITHRAL, PAGORHITHRAL AND KRYOKRENE: THREE NEW TYPES OF ALPINE STREAMS AND SPRINGS, (IN GERMAN),
Basel Univ. (Switzerland). Botanisches Inst.
P. Geissler.
Bull Soc Suisse 85(4), p 303-309, 1975.

Descriptors: *Classification, *Alpine streams, Cryptogram, Habitats, *Kryokrene, *Pagorhithral, Phytosociology, *Psychrorhithral, *Springs, *Streams, Zonation.

Phytosociological studies of alpine springs and streams were compared with the zonation of habitats uused in limnology. The following terms were proposed. Psychrorhithral streams include cold, fast running streams, situated above the Epirhithral in which vegetation of cryptograms is often abundantly developed. Pagorhithral streams are very fast running glacier-streams, almost without vegetation, rich in suspended particles. Kryokrene springs are those in block-screes with poor vegetation. Temperature of spring-water is 0-3 C, sometimes with periodic desiccation.--Copyright 1977, Biological Abstracts, Inc.
W78-01405

ADJUSTMENT TO QUATERNARY CLIMATIC CHANGE BY THE COLORADO RIVER IN CENTRAL TEXAS,
Texas Univ. at Austin. Dept. of Geological Sciences.
V. R. Baker, and M. M. Penteado-Orellana.
Journal of Geology, Vol. 85, No. 4, (July 1977), p 395-422, 12 fig, 3 tab, 96 ref.

Descriptors: *Climates, *Arid climates, *Quaternary period, *Geomorphology, Shores, Alluvial channels, Flood plains, Sediments, Rivers, River basins, Sedimentology, Sedimentation, Meanders, Channels, Channel flow, *Texas, Sediment load, River flow, Humid climates, Degradation(Stream), Erosion, Stream erosion, Mapping.
Identifiers: Climatic change, Geomorphic mapping, Meander wavelength, River terraces, *Colorado River(Tex).

Unlike previous studies of the evoluation of river terraces which emphasize cyclical patterns of aggradation, stability, and degradation, this study emphasizes the morphology and sedimentology of inland paleochannels composing portions of ancient flood plain systems. Ten different channel patterns and sediment assemblages were revealed by geomorphic mapping of flood plain and channel morphology in the Quaternary alluvial valley of the Colorado River. Studies of the modern and ancient patterns indicate cyclic changes in channel width, meander wavelength, sinuosity, and sediment type. However, the amplitudes of the cycles vary. Morphology is sufficiently preserved to use empirical correlations of meander wavelength to discharge in interpreting paleohydrology. The influence of sediment load and flood magnitude-frequency changes preclude quantitative speculation. Studies of fluvial sediments, relict paleosols, and paleobiology support the hypothesis that Quaternary climate in the area alternated between arid and humid intervals. Fine-grained loads and high-sinuosity patterns on flood plains were charcteristic of humid phases. The onset of arid conditions interrupted flood plain development with degradational activity while continued arid conditions promoted aggradation by low-sinuosity stream transport of polygenetic suites of coarse sediments from nearby hillslopes. Transition to humid streams were gradual and probably with more uniform streamflow characteristics. (Ullery-Arizona)
W78-01504

THE GEOLOGIC SETTING OF THE SANDUSKY RIVER BASIN,
Bowling Green State Univ., OH. Dept. of Geology.
For primary bibliographic entry see Field 4A.
W78-01520

CALIBRATION OF ROUGHNESS PARAMETERS FOR MATHEMATICAL MODELS OF RIVERS .WITH FLOOD-PLAINS USING DYNAMIC PROGRAMMING, (IN GERMAN),
For primary bibliographic entry see Field 8B.
W78-01540

WATER RESOURCES PLANNING FOR RIVERS DRAINING INTO MOBILE BAY: A USERS'

MANUAL FOR THE TWO DIMENSIONAL HYDRODYNAMIC MODEL,
Alabama Univ., University. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5B.
W78-01544

FORCED PLUME CHARACTERISTICS,
Monash Univ., Clayton (Australia). Geophysical Fluid Dynamics Lab.
For primary bibliographic entry see Field 8B.
W78-01625

RAINFALL ANALYSIS FOR DRAINAGE DESIGN, VOLUME I, SHORT-DURATION PRECIPITATION FREQUENCY,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 2B.
W78-01648

RAINFALL ANALYSIS FOR DRAINAGE DESIGN, VOLUME III, INTENSITY-DURATION-FREQUENCY CURVES,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 2B.
W78-01650

2F. Groundwater

RESEARCH ON UNDERGROUND WATERS: 27. STUDY OF AN EPIKARSTIC AQUIFER OF THE CORBIERES (OPOUL, PYRENEES-ORIENTALES) (IN FRENCH),
J. Y. Bertrand.
Ann Speleol 30(3): 513-537. 1975 (English summary).

Descriptors: *Karst hydrology, *Aquifers, Invertebrates, *Aquatic animals, France.

A study of discharge points of an epikarstic aquifer gave some information about its hydrogeological, physical, chemical and biological characteristics. Analysis of the data obtained during the hydrological cycle proved the existence of perennial stocks. High mineralization may be the result of evapotranspiration; seasonal and sometimes daily variations in the temperature of water show that the circulation is closed to the topographic level. The heterogeneity of the aquifer was demonstrated. More than 17,000 aquatic invertebrates were collected. They belong to 17 spp. (Phagocata sp., Haplotaxis corbarensis, a hydroacarian, Pseudocandona sp., Graetiella bertrandi, Ceuthonectes gallicus, Elaphoidella leruthi, Nitocrella sp., Bryocamptus typhlops, Bathynella sp., Faucheria faucheri, Stenasellus buili, Niphargus Kochianus pachypus, an oligochaete, a trichopteran and a dipteran.) of which 10 are hypogean. Quantitative investigations of several floods gave a definite representation of the populations, principally copepods. Epikarstic aquifers are suitable biotopes for the invasion of rich and diversified populations.--Copyright 1977, Biological Abstracts, Inc.
W78-01192

STUDIES ON SALINIZATION OF GROUNDWATER, 1. THEORETICAL CONSIDERATION ON THE THREE-DIMENSIONAL MOVEMENT OF THE SALT WATER INTERFACE CAUSED BY THE PUMPAGE OF CONFINED GROUNDWATER IN FAN-SHAPED ALLUVIUM,
Ehime Univ., Matsuyama (Japan). Dept. of Applied Physics.
Y. Kishi, and Y. Fukuo.
Journal of Hydrology, Vol. 35, No. 1/2, p 1-29, October 1977. 8 fig, 8 ref, 2 append.

Descriptors: *Groundwater flow, *Sea water, *Saline water intrusion, *Saline water-freshwater interfaces, *Alluvial fans, Mathematical models, Confined water, Pumping, Equations, Numerical analysis, Hydraulic conductivity, Density, Darcys law, Boundaries(Surfaces).
Identifiers: Three-dimensional flow, Ghyben-Herzberg relation, Green's functions, Image method.

A theoretical model was presented on the phenomenon of seawater intrusion into confined groundwater to make clear the relationship between the amount of pumping of freshwater and the corresponding three-dimensional spatial distribution of salt water. First, differential equations were derived for the fresh and salinized regions, respectively, from the fundamental equation of confined water. The equation in the salinized region, which is a quasilinear differential equation, can be transformed to a linear one and then is continued to the equation in the fresh region, resulting in the two-dimensional Poisson's equation which is applicable to the entire region. The equation in steady-state was solved in integral form by using the method of Green's functions and was expressed simply in the case of idealized field conditions analogous to a fan-shaped alluvium by the usual method of images. Finally, some numerical examples were shown for the case of uniform pumpage in a circular region. (Visocky-ISWS)
W78-01287

DIFFUSE FLOW AND CONDUIT FLOW IN LIMESTONE TERRAIN IN THE MENDIP HILLS, SOMERSET (GREAT BRITAIN),
University of East Anglia, Norwich (England). School of Environmental Sciences.
T. C. Atkinson.
Journal of Hydrology, Vol. 35, No. 1/2, p 93-110, October 1977. 7 fig, 2 tab, 31 ref.

Descriptors: *Groundwater movement, *Karst hydrology, *Springs, *Flow, Karst, Limestones, Recharge, Caves, Aquifers, Conduits, Percolation, Tracers, Dye releases, Discharge(Water), Baseflow, Hydrogeology.
Identifiers: *Diffuse flow, *Conduit flow, *Mendip Hills(England), England.

The hydrogeology of the karstic Carboniferous Limestone was described. Water tracing established recharge areas for 15 major springs, and water budgets confirm the size of the areas found. Groundwater flow occurs in 2 modes: turbulent conduit flow and diffuse Darcian flow in fine fractures. Recharge is 50% quickflow via caves and closed depressions and 50% slower percolation. Active storage in the diffuse component (S = 0.92%) is 30 times greater than in phreatic conduits. Diffuse hydraulic conductivity is 0.89 m/day, and an average of 60-80% of groundwater is transmitted by conduits in this maturely karsted and steeply dipping aquifer. (Sims-ISWS)
W78-01288

CARBON DIOXIDE IN THE ATMOSPHERE OF THE UNSATURATED ZONE: AN IMPORTANT CONTROL OF GROUNDWATER HARDNESS IN LIMESTONES,
University of East Anglia, Norwich (England). School of Environmental Sciences.
T. C. Atkinson.
Journal of Hydrology, Vol. 35, No. 1/2, p 111-123, October 1977. 6 fig, 4 tab, 30 ref.

Descriptors: *Carbon dioxide, *Hardness(Water), *Groundwater, *Limestones, Caves, Springs, Spring water, Calcium, Calcite, Alkalinity, Water chemistry, Organic material, Groundwater movement, Atmosphere, Unsaturated flow, Chemistry, Hydrogeology, Hydrology.
Identifiers: *Ground-air carbon dioxide, *Mendip Hills(England), England.

Weekly analyses of springwaters in the Mendip Hills, England, showed constant partial pressure of CO2. Soil air partial pressure of CO2 (measured directly and calculated from soil water analyses) fluctuates seasonally and is almost always less than the partial pressure of CO2 of springs. A source of CO2 in the unsaturated zone was proposed to account for the discrepancy, supported by direct measurements of CO2 in fractures in cave walls and analyses of drip waters. The partial pressure of CO2 increases with depth, and values at the bottom of caves are similar to spring waters. A possible source is decay of downwashed soil organic matter. (Sims-ISWS)
W78-01289

EFFECTS OF A RECREATIONAL IMPOUNDMENT ON NEARBY NATURAL LAKES: A CASE STUDY,
Wisconsin Univ.-Oshkosh. Dept. of Geology.
For primary bibliographic entry see Field 2H.
W78-01291

THE ROLE OF DRAINAGE SYSTEMS IN SOIL RECLAMATION OF THE MUGAN-SALYANY STEPPE (IN RUSSIAN),
For primary bibliographic entry see Field 2G.
W78-01344

WATER SUPPLY AT LOS ALAMOS DURING 1976,
Los Alamos Scientific Lab., NM.
For primary bibliographic entry see Field 4B.
W78-01547

EXPERIENCE IN THE USE OF THE METHOD OF MICROELECTRICAL VERTICAL SOUNDINGS IN STUDYING IRRIGATED SOIL EVOLUTION, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of General Soil Science.
E. M. Anikanova, and T. A. Pavlova.
Vestn Mosk Univ Biol Pochvoved 31(2), p 87-91, 1976.

Descriptors: *Groundwater, *Mineralogy, *Water levels, Salts, Rocks, Moisture content, *Soil moisture, *Sounding, Irrigated land.

Joint geophysical and soil research was undertaken in the Bagaebsko-Sadkov-sky ameliorative system in the Rostov region (Russian, SFSR USSR), to study the possibility of using the microelectrical soundings method to solve such amelioration problems as determination of the depth of ground-water levels and their mineralization, evaluation of the volume of water soluble salts, and the moisture of rocks over the groundwater level.--Copyright 1977, Biological Abstracts, Inc.
W78-01559

LEAKAGE OF GROUNDWATER THROUGH A SLOT IN A SHEET PILE,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8D.
W78-01632

2G. Water In Soils

ANALYSIS OF HYDROLOGICAL FEATURES OF PORTIONS OF THE LAKE ONTARIO BASIN USING SKYLAB AND AIRCRAFT DATA,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 7C.
W78-01186

EVAPORATION FROM SOLONCHAKS AND SALTWORT VEGETATION (IN RUSSIAN),
For primary bibliographic entry see Field 2D.
W78-01207

WATER AND PHYSICAL PROPERTIES OF SOIL AND COTTON YIELDS DEPENDING ON DIFFERENT METHODS OF BASIC TILLAGE, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Inst. Khlopkovodstva. Leningrad (USSR).
S. N. Ryzhov, and L. N. Slesareva.
Pochvovedenie 11. 57-70. 1976. English summary.

Descriptors: *Soil physical properties, *Moisture content, *Cultivation, Loam, Cotton, Crop production, Soil structure, Soil density.
Identifiers: Serozem, USSR.

Different depth and methods of basal tillage of an irrigated typical serozem with a heavy loam texture changed its structural composition, density, hardness and porosity controlling the direction of the main soil regimes and affecting the yields of cotton. The highest effect was obtained from 2-storeyed plowing and rototilling to the depth of 30 cm with autumn ridging and 2-storeyed plowing to the depth of 30 cm.--Copyright 1977, Biological Abstracts, Inc.
W78-01227

MOVEMENT OF SALTS WITH PELLICULAR WATER IN SOILS, (IN RUSSIAN),
Vsesoyuznyi Nauchno-Issledovatelskii Inst. Gidrotekhniki i Melioratsii, Moscow (USSR).
S. M. Pakshina, and V. R. Petukhov.
Pochvovedenie 6. 59-65. English summary.

Descriptors: *Salts, *Soils, *Ion transport, Boundaries(Surfaces), Chlorine, Sulfates, Thin films, Ionization.
Identifiers: Pellicular water, USSR.

Possible types of film-water in soils and calculations of ion flows in each case are considered. Thin layers have both equal and different potentials but signs are similar on both boundaries. Asymmetric films have both positive and negative potentials on the liquid-air boundary, depending on quantity and kind of anions in the soil solution. Calculations using the modern double-layer theory showed that a local increase of Cl-concentration (when film-water and a source of salt are present in soil) takes place during the movement of thin layers and asymmetric films which have a negative potential on the liquid-air boundary. The increase of sulfate concentration occurs only with the movement of symmetric films.--Copyright 1977 Biological Abstracts, Inc.
W78-01228

ERODIBILITY OF COARSE SAND-CLAYEY SILT MIXTURES,
Lehigh Univ., Bethlehem, PA. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W78-01285

CHANGES IN BIOCHEMICAL AND WATER-PHYSICAL PROPERTIES OF SOILS IRRIGATED WITH MINERALIZED WATER (IN RUSSIAN),
Ukrainian Research Inst. of Agrochemistry and Soil Science, Kharkov (USSR).
N. P. Rus'ko, and M. P. Shkirya.
Pochvovedenie 10. 94-99. 1976. (Engl summ).

Descriptors: *Soil chemical properties, *Soil physical properties, *Irrigation effects, *Bromegrass, Vegetation effects, Plant growth, Grasses, Mineral water, Soil compaction, Germination, Turf.
Identifiers: U.S.S.R.

The effect of prolonged growth of smooth brome grass as 1 site was studied with and without irrigation. The prolonged growth of smooth brome grass and the use of irrigation led to overcrowding, compaction, turfness of crops and to a sharp decrease in seed productivity.--Copyright 1977, Biological Abstracts, Inc.
W78-01293

PREPARATIVE-SCALE SIZE FRACTIONATION OF SOILS AND SEDIMENTS AND AN APPLICATION TO STUDIES OF PLUTONIUM GEOCHEMISTRY,
Argonne National Lab., IL. Radiological and Environmental Research DiV.
For primary bibliographic entry see Field 2J.
W78-01301

PRECISION WITH WHICH SELECTED SOIL PHYSICAL PARAMETERS CAN BE ESTIMATED,
Texas A and M Univ., Overton. Agricultural Research and Extension Center.
T. C. Keisling, J. M. Davidson, D. L. Weeks, and R. D. Morrison.
Soil Science, Vol 124, No 4, p 241-248, October 1977. 3 fig, 5 tab, 16 ref.

Descriptors: *Soil physical properties, *Soil water movement, *Measurement, *Estimating, Depth, Sampling, Reliability, Hydraulic conductivity, On-site laboratories, Mathematical studies, Forecasting.
Identifiers: Solute movement.

Under field conditions, the validity of many predictions concerning the movement of soil water and solute depends on the inherent variability of the soil parameters used in making the predictions. Data concerning the natural variability of many physical parameters of soils are lacking. A single soil series was studied over a land area 7.3 km in radius. Estimates were made of how some physical properties of soil vary with depth and with large and small land areas. Estimates of the number of samples required to achieve a given precision for each soil parameter also were made. The variability arising from location to location was found to be the major influence on the variation of soil water conductivity. Restricting sampling to a radius of 5.6 km or sampling within morphological horizons reduced the variance of the soil water conductivity. A range of 1 to 56 locations was required to achieve a standard deviation equal to 10% of the mean for the different physical properties of soil measured. (Visocky-ISWS)
W78-01302

RAINFALL INFILTRATION INTO BARE SOILS,
Ministry of Agriculture, Tel-Aviv (Israel). Soil Conservation and Drainage Div.
J. Morin, and Y. Benyamini.
Water Resources Research, Vol 13, No 5, p 813-817, October 1977. 5 fig, 3 tab, 6 ref, 1 append.

Descriptors: *Infiltration, *Model studies, *On-site investigations, Mathematical models, Soils, Soil properties, Precipitation(Atmospheric), Rainfall, Rainfall intensity, Mulching, Impact(Rainfall), Infiltration rates, Agriculture.
Identifiers: *Bare soils, Crust formation.

Raindrop impact destroys the surface aggregates of soils and gradually forms a continuous crust. Infiltration rates of bare soils are determined by the mentioned process. A theoretical model presented previously was tested under field conditions with a sandy loam soil. The effect of the crust's structure was tested under a 3 rainfall intensities and in wetting and drying cycles. The results of the tests confirmed the theoretical model. The study demonstrated quantitatively that the major factor determining the reduction of infiltration rates is crust formation and not moisture regime. (Sims-ISWS)
W78-01306

EFFECT OF HOLE SIZE ON PERCOLOATION RATE IN A FIELD PERCOLATION TEST,
Ontario Ministry of the Environment, Toronto. Pollution Control Branch.
H. T. Chan.
Publication No 560, August 1976. 65 p, 10 fig, 15 tab, 10 ref, 1 append.

Descriptors: *Infiltration, *Percolation, *Effects, Soil disposal fields, Soil physics, Permeability, Infiltrometers, Soil moisture meters, Soil water movement, On-site investigations, Mathematical studies.
Identifiers: *Percolation pits, Septic systems, Holes, Percolation rates, Soil disposal systems.

The influence of the hole size in a field percolation test was investigated at the Whitby Experimental Station of Ontario ministry of the Environment. It was found that the inverse percolation rate (I.P.R.), which is defined as the time taken by the water level in the hole to drop one unit distance, increases with the diameter of the test hole provided that the sum effect of other factors on the I.P.R. is approximately equal. However, under field testing conditions, a number of factors can affect simultaneously the I.P.R. in the test, and the effect of hole size can be overshadowed. Consequently, there is no apparent trend between the hole size and the I.P.R. Generally the variability in the I.P.R. obtained in different sized holes is less than the variability of data due to soil and climatic conditions. Hence, it can be concluded that in practice the effect of the hole size on the I.P.R. is not significant. Other aspects of the field percolation testing also have been studied. Conclusions were obtained regarding the degree of saturation of the soil adjacent to the test hole and the significant influence of the depth of the water column in the hole. (Adams-ISWS)
W78-01312

THE ROLE OF DRAINAGE SYSTEMS IN SOIL RECLAMATION OF THE MUGAN-SALYANY STEPPE (IN RUSSIAN),
A. P. Akhmedov.
Pochvovedenie 6. 93-98. 1976. English summary.

Descriptors: *Land reclamation, *Drainage practices, *Saline soils, Groundwater, Mineral water, Surface-groundwater relationships, Cotton.
Identifiers: Azerbaijan-SSR, Mugan-Salyany, USSR.

A collector-drainage system was used to wash 125,000 ha of salinized lands (Planted in cotton) in Mugan-Salyansk steppe, Azerbaijan, SSR, USSR. A deep horizontal drainage efficiently controlled soil salinization with a high occurrence of strongly mineralized ground water without natural withdrawal.--Copyright 1977, Biological Abstracts, Inc.
W78-01344

WATER REGIME OF A TYPICAL THICK CHERNOZEM OF THE (DNIEPER RIVER) LEFT-BAND FOREST-STEPPE ZONE OF THE UKRAINIAN SSR (IN RUSSIAN),
Ukrainian Research Inst. of Agrochemistry and Soil Science, Kharkov (USSR).
G. Ya. Chesnyak.
Pochvovedenie 6. 37-45. 1976. English summary.

Descriptors: *Chernozems, *Water balance, *Soil water movement, *Cultivation, Soil moisture, Forests, Seasonal, Moisture availability, Soil-water-plant relationships.
Identifiers: Dnieper, Ukrainian-SSR, USSR, Agricultural practices.

The water regime in virgin and plowed chernozems of the left-bank forest steppe of the Dnieper River, Ukraine (USSR), is similar; in

plowed soils moisture circulation occurs in a thicker layer (2.5 m) than in virgin soils (1.5-1.8 m). In Plowed chernozems the thickness of seasonal moisture dynamics and the intensity of moisture circulation is determined by biology and agrotechniques of cultivated crops. The average moisture expenditure during the growing season is higher under tilled-crop than under crops of continuous sowing.--Copyright 1977, Biological Abstracts, Inc.
W78-01346

CONVERSION OF SLUDGES INTO 'TOPSOILS' BY EARTHWORMS,
State Univ. of New York at Syracuse. Coll. of Environmental Science and Forestry.
For primary bibliographic entry see Field 5E.
W78-01469

PHYSICAL PROPERTIES AND MOISTURE CONDITIONS IN CLAYEY GLEY SOILS OF THE KOLKHIDA LOWLAND, (IN RUSSIAN),
All Union Research Inst. of Tea and Subtropical Plants.
For primary bibliographic entry see Field 3F.
W78-01472

MANAGING SALINE WATER FOR IRRIGATION.
International Center for Arid and Semi-Arid Land Studies, Lubbock, TX.
For primary bibliographic entry see Field 3C.
W78-01492

MODELS FOR PREDICTING THE IMPACT OF IRRIGATION ON SOIL SALINITY,
Hebrew Univ., Jerusalem (Israel). Div. of Soil Physics.
For primary bibliographic entry see Field 3C.
W78-01495

COMPOSITION OF SALINE DRAINAGE WATER IN IRAQ AND ITS USE,
State Organization of Soils and Land Reclamation, Baghdad (Iraq).
For primary bibliographic entry see Field 3C.
W78-01497

RESISTANCE TO SODA SALINIZATION OF SOME IRAQI SOILS,
Baghdad Univ. (Iraq). Dept. of Soil.
For primary bibliographic entry see Field 3C.
W78-01498

UTILIZATION OF HIGHLY SALINE WATERS FOR WHEAT PRODUCTION: A CASE STUDY IN THE ARID ZONE OF INDIA,
Central Arid Zone Research Inst., Jodhpur (India).
For primary bibliographic entry see Field 3C.
W78-01507

SOIL SALINIZATION IN THE DELTA OF THE RIVER NILE, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Pochvennyi Inst.
For primary bibliographic entry see Field 3C.
W78-01542

STUDIES ON THE SOIL-WATER SYSTEM IN THE FIELD: III. DESORPTION CURVE EQUATION, (IN JAPANESE),
Utsunomiya Univ. (Japan). Coll. of Agriculture.
K. Soma.
Bull Coll Agric Utsunomiya Univ. 9(3), p 57-74, 1976.

Descriptors: *Adsorption, *Desorption, *Soil moisture, Distribution, Energy, Equations, Isotherms, Movement, Soils.

The desorption curve represents the relation between soil moisture stress and soil moisture content and is used for studying the behavior of water movement in the unsaturated zone. Applying the mathematical expression of sigmoidal shape which relates the probability distribution of particles to their energy status for the desorption curve as well as the adsorption isotherm curve, the desorption curve equation pF - A + B . (v/vo -c-1) is obtained; (where pF = water holding index, v = amount of water, vo = amount of saturation, and A, B, C are constants). Some practical applications and results of this desorption curve equation are given. (See also W73-13091) --Copyright 1977 Biological Abstracts, Inc.
W78-01575

SOME METHODS FOR DETERMINING HYDROLOGICAL PROPERTIES OF THE SOIL AND THEIR DEPENDENCE ON OTHER PHYSICAL PROPERTIES, (IN SERBO-CROATIAN),
Zagreb Univ. (Yugoslavia). Inst. of Pedology and Technology of Soil.
M. Zic.
Poljopr Znan Smotra 37(47), p 107-114, 1976.

Descriptors: *Clays, *Soil physical properties, *Soil analysis, Sampling, Measurement, *Porosity, Soil moisture, Humus, Soil water, Wilting.
Identifiers: *Yugoslavia.

Sixty soil samples of various mechanical composition and humus content were analyzed. Colluvial soils, Organic Calcomelanosis, Rendzinas, Calcocambisols and Luvic Calcocambisols on limestones and dolomites, Terra rossa, Luvisols on loess and Rigosols of intensive orchards and vineyards on loess and pleistocene loams were represented. A strong and positive correlation was determined between the soil water capacity after Novak and porosity (r = correlation coefficient = 0.57xx). A very strong, but negative correlation (r = - 0.84xx) existed between water retention at 2 pressure of 0.33 bars and porosity. Due to different correlations to porosity, the use of soil samples in natural condition is recommended. For determining the balanced state of soil and water, roughly corresponding to the wilting point, both applied methods render positive results and are intercorrelated (r = 0.90xx). The results obtained by calculation (from the values for loss due to drying at 105 C) were slightly lower. The methods of Richards is preferred. Between the values for the physiologically inert water and the percent clay content, a very strong correlation was determined and the correlation coefficient was highly significant (r = 0.77xx, 0.75xx). The effect of the mechanical soil composition was dominant, primarily that of the proportion, and probably quality, of clay.--Copyright 1977 Biological Abstracts, Inc.
W78-01629

EFFECTIVENESS OF AGRICULTURAL IMPROVEMENTS FOR THE CULTIVATION OF TEA SHRUBS IN THE KOLKHIDA LOWLAND, (IN RUSSIAN),
For primary bibliographic entry see Field 3F.
W78-01689

SOIL WATER SYSTEM AND YIELD OF FIELD CROPS WITH DIFFERENT TILLAGE SYSTEMS, (IN RUSSIAN),
Moskovskaya Sel'skokhozyaistvennaya Akademiya (USSR). Div. of Agriculture Experiment Methods.
For primary bibliographic entry see Field 3F.
W78-01691

2H. Lakes

ANALYSIS OF HYDROLOGICAL FEATURES OF PORTIONS OF THE LAKE ONTARIO BASIN USING SKYLAB AND AIRCRAFT DATA,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 7C.
W78-01186

INTERNATIONAL FIELD YEAR FOR THE GREAT LAKES.
National Oceanic and Atmospheric Administration, Rockville, MD.
IFYGL Bulletin No. 19, February 1977. 93 p, 5 fig, 4 tab, 11 ref.

Descriptors: *Great Lakes, *International waters, *International Hydrological Decade, *Canada, *United States, *Lake Ontario, Programs, Projects, Publications, Bibliographies, Water circulation, Currents(Water), Lakes.
Identifiers: *International Field Year for the Great Lakes.

Listed were the official International Field Year for the Great Lakes (IFYGL) publications, joint Canadian-U.S. publications, and additions to the IFYGL bibliography. Two brief papers dealing with water circulation were included. Brief reports on both Canadian and U.S. scientific projects were given. Canadian and U.S. summaries of data available from IFYGL archives were tabulated. (Sims-ISWS)
W78-01187

ALGOLOGIC AND CHEMICAL-BACTERIOLOGIC STUDY OF THE WATER OF THE RESERVOIR OF THE PUBLIC PROMENADE OF CURITIBA, STATE OF PARANA, BRAZIL: I. GENERA OF MICROSCOPIC ALGAE (IN PORTUGUESE),
Universidade Federal de Pernambuco, Recife (Brazil). Inst. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W78-01198

HYGIENIC PROBLEMS OF PROTECTING WATER RESERVOIRS FROM POLLUTION WITH THERMAL ELECTRIC POWER PLANTS (IN RUSSIAN),
For primary bibliographic entry see Field 5C.
W78-01200

SAMPLING AND ANALYSIS OF MINNESOTA TRIBUTARIES AND MUNICIPAL POINT SOURCES TO LAKE SUPERIOR.
Minnesota Pollution Control Agency, Roseville.
For primary bibliographic entry see Field 5B.
W78-01229

EFFECTS OF A RECREATIONAL IMPOUNDMENT ON NEARBY NATURAL LAKES: A CASE STUDY,
Wisconsin Univ.-Oshkosh. Dept. of Geology.
J. I. Hoffman.
Water Resources Bulletin, Vol. 13, No. 5, p 941-952, October 1977. 5 fig, 1 tab, 18 ref.

Descriptors: *Impoundments, *Lakes, *Seepage, *Water quality, *Wisconsin, Recreation, Environmental effects, Groundwater, Groundwater movement, Water table, Nutrients, Pollutants, Chemicals, Hydrogeology, Hydrology.
Identifiers: *Legend Lake(Wis), *Menominee County(Wis).

Completion of a 1,270 acre recreational impoundment (Legend Lake) in the glacial sands of Menominee County, Wisconsin, produced geochemical and hydrologic alterations in some

nearby natural lakes. The impoundment was produced by the construction of three dams, one of which proved to be temporary, connecting 9 natural lakes and ponds of 383 acres with 951 acres of flooded lands. Water levels were raised 3-15 feet within the impounded area. Much of the flooded area was peat rich wetland associated with the prior drainage. Water depths are less than 15 feet in 70% of the impoundment. Three seepage lakes, located less than 1/2 mile from the impoundment, experienced shoreline flooding, shoreline and soil erosion, some tree kills, and increased turbidity. These lakes also experienced concentration increases in several chemical constituents which indicate an influx of impoundment water through a regional alteration in the groundwater flow paths. The three lakes were connected by canals, and a 2.3 cfs gravity drain with an auxiliary pumping station was built to return excess water to the outflow of the impoundment. Future projects of this type would benefit from a more extensive hydrologic and geochemical analysis prior to initiation. Had environmental assessments been required at the time of this development, as they now are in Wisconsin for similar projects, some of the problems encountered might have been alleviated. (Sims-ISWS)
W78-01291

RESPONSE OF THE COASTAL BOUNDARY LAYER ON THE NORTH SHORE OF LAKE ONTARIO TO A FALL STORM,
Canada Centre for Inland Waters, Burlington (Ontario).
F. M. Boyce.
Journal of Physical Oceanography, Vol 7, No 5, p 719-732, September 1977. 8 fig, 21 ref.

Descriptors: *Water temperature, *Lake Ontario, *Storms, *Great Lakes, On-site investigations, Upwelling, Winds, Temperature, Thermocline, Ships, Current meters, Measurement, Coasts, Circulation, Water circulation, Lakes, Limnology.

Water temperature measurements were made from a ship steaming continuously around a 10 km square on the north shore of Lake Ontario during a vigorous upwelling and downwelling cycle generated by a fall storm. The measurements revealed the existence of horizontal eddies and meanders within the coastal boundary layer having scales between 1 and 10 km. Active internal waves and a rich vertical microstructure also were observed. The above features are considered to be indicative of horizontal and vertical mixing processes generated by large-scale (10 km) adjustments of the coastal boundary layer. The wealth and diversity of the small-scale features suggest that the usual methods of parameterizing geophysical turbulence in terms of large-scale motion will be of little use in the coastal zone and consequently, the outlook for deterministic modeling of the coastal flow regimes is not bright. It was concluded that very simple dynamical models of the large-scale motions allow one to divide the shorelines of a large lake into a relatively small number of dynamically homogeneous zones. Details of the behavior within each zone must be supplied by field observations of winds, currents, and temperatures in the form of a regional coastal climatology. (Sims-ISWS)
W78-01309

DETERMINATION OF TRACE ELEMENT CONTAMINATION OF SEDIMENTS BY MULTIELEMENT ANALYSIS OF CLAY-SIZE FRACTION,
Wisconsin Univ., Madison. Dept. of Soil Science.
P. A. Helmke, R. D. Koons, P. J. Schomberg, and I. K. Iskandar.
Environmental Science and Technology, Vol 11, No 10, p 984-989, October 1977. 4 fig, 2 tab, 22 ref. DACW37-74-C-0013.

Descriptors: *Trace elements, *Bottom sediments, *Dredging, *Lake Superior, *Pollutants, *Geochemistry, Chemical properties, Analytical techniques, Water pollution sources, Sampling, Water quality, Bottom sampling, Heavy metals, Sediments, Water pollution.
Identifiers: Clay-size fractions.

Samples of total sediments and the clay-size fraction were analyzed for more than 20 elements to evaluate the use of trace element concentrations in the fine fraction to determine if the sediments have received anthropogenic inputs of elements. The samples were from Lake Superior and the harbor of Duluth, Minn., and Superior, Wis. The concentrations of trace elements in the samples of total sediments vary by more than a factor of 2 over the study area, and they are not related in a simple fashion to sample location. The ability to detect contaminated sediments is not improved when the values of concentrations are corrected for the effects of dilution by quartz. In contrast, the concentrations of trace elements in the clay-size fraction vary less than 15% from their mean values from site to site except for some areas that have high concentrations of Cr, Cu, Zn, Hg, and As. The high concentrations of these elements result from anthropogenic inputs. (Henley-ISWS)
W78-01311

EUTROPHICATION: A THREAT TO NEW HAMPSHIRE'S LAKES AND PONDS - WHAT LEGAL TOOLS ARE AVAILABLE FOR PROTECTION,
Southern Rockingham Regional Planning District Commission, Salem, NH.
For primary bibliographic entry see Field 5G.
W78-01359

PROCEEDINGS OF SANDUSKY RIVER BASIN SYMPOSIUM, HELD AT TIFFIN, OHIO ON MAY 2-3, 1975.
International Reference Group on Great Lakes Pollution from Land Use Activities.
For primary bibliographic entry see Field 5B.
W78-01518

BENTHIC MICROINVERTEBRATE POPULATIONS OF SANDUSKY BAY,
Ohio State Univ., Put-in-Bay. Center for Lake Erie Area Research.
For primary bibliographic entry see Field 5C.
W78-01531

ABUNDANCE AND POPULATION TRENDS OF SANDUSKY BAY FISHES,
Ohio State Univ., Put-in-Bay. Center for Lake Erie Area Research.
For primary bibliographic entry see Field 5C.
W78-01532

USE OF HEAVY METAL POLLUTION IN SANDUSKY BAY SEDIMENTS TO DETERMINE SEDIMENTATION RATES,
Bowling Green State Univ., OH. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W78-01533

THE USE OF UNDERWATER EQUIPMENT IN FRESHWATER RESEARCH.
Virginia Polytechnic Inst. and State Univ. Blacksburg.
For primary bibliographic entry see Field 7B.
W78-01537

COMPARISON OF COMPUTER SIMULATION MODELS WITH FIELD DATA FROM NEARSHORE ENVIRONMENTS,
Williams Coll. Williamstown, MA.
W. T. Fox, and R. A. Davis, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A025 682, Price codes: A04 in paper copy, A01 in microfiche. Technical Report No. 15, Office of Naval Research, Arlington, Va., April 1976. 54 p, 20 fig, 21 ref, 2 append.

Descriptors: *Computer models, *Simulation analysis, *Coasts, *Storms, *Beaches, *Waves(Water), *Fourier analysis, *Computer programs, Beach erosion, Maps, Winds, Meteorological data, Systems analysis, Lake Michigan, Forecasting.
Identifiers: *Longshore currents, *Nearshore environment, Field data, Bar erosion.

Computer simulation models of coastal processes provide an accurate means of predicting wave and current conditions in the nearshore environment. A 7-year study was undertaken to develop and test a series of computer simulation models based on time-series data from field studies. The field studies include Stevensville, Michigan (1969); Sheboygan, Wisconsin (1972); Mustand Island, Texas (1971-72); Cedar Island, Virginia (1973); South Beach, Oregon (1973-74); Zion, Illinois and South Haven, Michigan (1974) and Plum Island, Massachusetts (1975). A series of computer programs were developed for analysis and plotting of the field data. A Fourier analysis program was used to plot smoothed curves for weather, waves and current variables. Topographic maps and maps of erosion and deposition were plotted based on daily beach and nearshore profiles. An 'Area-time Prism' model was formulated to graphically portray changes in beach and nearshore bar configuration through time. A 'Coastal Process Simulation Model' was developed to predict wave and longshore current conditions, and beach and bar erosion on the eastern shore of Lake Michigan. A 'Coastal Storm Model' based on the size, shape and intensity of a coastal storm predicts wind, waves and currents for any coastal orientation. The coastal storm model can hindcast conditions of past storm or produce short-term forecasts in developing storms. The model is based on an inverted normal curve which is rotated around the center of a storm system. (Bell-Cornell)
W78-01543

EFFECT OF PULP MILL EFFLUENT ON SURFICIAL SEDIMENTS OF WESTERN NIPIGON BAY, LAKE SUPERIOR,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W78-01554

EXTENT OF EFFLUENT INFLUENCE ON LAKE WATER DETERMINED BY BACTERIAL POPULATION DISTRIBUTIONS,
Ontario Ministry of the Environment, Rexdale. Lab Service Branch.
For primary bibliographic entry see Field 5B.
W78-01558

DENSITY, DISTRIBUTION, AND MOVEMENT OF NIPIGON BAY FISHES IN RELATION TO A PULP AND PAPER MILL EFFLUENT,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W78-01563

CONTRIBUTIONS TO THE ECOLOGY OF BENTHIC ALGAE IN THE ALPINE ZONE OF THE PYRENEES: II. CYANOPHYCEANS AND OTHER ALGAL GROUPS, (IN GERMAN),
Baden-Wuerttemberg Landesanstalt fuer Umweltschutz (West Germany). Inst. of Wasserund Abfallwirtschaft.
D. Backhaus.
Int Rev Gesamten Hydrobiol 61(4) p 471-516, 1976.

Descriptors: *Calcium, *Algae, Lakes, *Benthic flora, *Systematics, *Cyanophyta, Aquatic

vegetation, Chantransia-Chalybea-var-profunda, Cyanostylon-microcystoides, Desmosiphon-maculans, Gloeocapsa-tornensis, Homeothrix-sinensis, Hydrococcus-cesatii, Lyngbya-lachneri, Nitella-flexilis, Nostoc-zetter-stedtii, Onkonema-sp, Pleurocapsa-minor, Schizothrix spp.

An investigation was made of the benthic and littoral microphytic vegetation of Esteragne Brook, and Porth-Bielh Lake in the High Pyrenees. Both waters combine a low Ca content with a consistently basic pH. A comparison of their flora with that of other lakes may help to deal with the problem of whether the algal flora is determined by the Ca content or the pH. The algal flora of Esteragne Brook differs little from that of low-Ca streams of the central European highlands. In Porth-Bielh Lake there is a distinct depth-zonation among the dominant algae. The dominant taxa at a depth of 0-0.5 m are: Schizothrix lacustris f. lutescens, S. calcicola, Gloecapsa tornensis, Pleurocapsa minor with Cyanostylon microcystoides and Hydrococcus cesatii praticularly on the underside of the stones; from 0.5-1.5 m: a massive growth of Nostoc zetter-stedtii; from 2.5-4.5 m: S. funalis; from 7 m: Nitella flexilis. The lake also includes a number of rare and little known forms such as Onkonema sp., cf. Desmosiphon maculans, Lyngbya lachneri, Homeothrix sinensis, Chantransia chalybea var. profunda, Siphonenma polonicum chamaesiphonoides. Green algae were almost completely absent from the upper zones, in contrast to the usual findings. The littoral flora has a distinctive character, and is not directly comparable with that usually found in lakes with either high or low calcium content. A certain resemblance to lakes with a high Ca content can be found only if all the forms present particularly with lower abundances are considered. The strong development of lithophytes should be emphasized in contrast to their usually low density in lakes with low Ca content. The systematic section deals with systematic and taxonomic problems in a number of difficult forms.--Copyright 1977, Biological Abstracts, Inc.
W78-01583

ANALYSIS OF A PULP AND PAPER MILL EFFLUENT PLUME,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W78-01584

BENTHIC FAUNA OF BODIES OF WATER OF THE LOWER TUNGUSKA BASIN, (IN RUSSIAN),
Siberian Research Inst. of the Fish Industry, Krasnoyarsk (USSR). Krasnoyarsk Div.
N. V. Vershinin.
Gidrobiol Zh 12(4), p 43-48, 1976.

Descriptors: *Benthic fauna, Surface waters, *Invertebrates, Flood plains, Lakes, Tributaries, River basins.
Identifiers: Zoobenthos, *Tunguska Basin(USSR), Biocenoses.

The qualitative and quantitative composition of invertebrate zoobenthos of the lower Tunguska, its tributaries and flood plain lakes were analyzed depending on the flow rate, depth and temperature of water and the soil character. Biocenoses are determined and their role in the formation of zoobenthos is shown. Zoobenthos from the lower Tunguska basin is compared with zoobenthos from other high-latitude water bodies.--Copyright 1977 Biological Abstracts, Inc.
W78-01586

PERSISTENCE OF DISSOLVED ORGANIC COMPOUNDS IN KRAFT PULP AND PAPER MILL EFFLUENT PLUMES,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5B.
W78-01587

SURFACE CIRCULATION IN THE GREAT LAKES AS OBSERVED BY LANDSAT-1 AUGUST 1972 TO DECEMBER 1973: SOUTHERN LAKE MICHIGAN,
National Environmental Satellite Service, Washington, DC.
H. G. Stumpf, and A. E. Strong.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 1973-1988, September 1975. 10 fig, 1 tab, 8 ref. NASA S-70246-AG.

Descriptors: *Lake Michigan, *Water circulation, *Remote sensing, *Tracers, Lakes, Surfaces, Currents(Water), Suspended solids, Pollutants, Algae, Limnology, Analysis, Analytical techniques, Winds, Wind velocity, Satellites(Artificial).
Identifiers: LANDSAT.

The surface current circulation patterns of southern Lake Michigan were charted for all cardinal and subcardinal wind directions, employing LANDSAT-1 observations of the distribution of natural tracing material borne in the surface waters. The colorants consisted chiefly of river discharges composed of suspended sediments, pollutants, and algae; extensive chemical precipitations proved valuable for areas farther from shore. Comparison of the satellite-derived surface current charts with previous theoretical and empirical studies showed good agreement. (See also W78-01589) (Humphreys-ISWS)
W78-01609

THE RESULTS ARE USEFUL FOR HELPING TO DETERMINE AN OPTIMUM SPECTRAL BANDWIDTH FOR FUTURE SPACE SENSORS WHERE A BOTTOM REFLECTION IS DETECTABLE. (SEE ALSO W78-01589) (HUMPHREYS-ISWS)
eatures because of water transparency in the blue/green portion of the spectrum. Depth to 20 meters were measured with the S-192 in the Puerto Rico test site. The S-190B photography, with its improved spatial resolution, clearly delineates the triple sand bar topography in the Lake Michigan test site. Several processing techniques were employed to test for maximum depth measurement with least erro
For primary bibliographic entry see Field 7C.
he Skylab S-192 MSS for measurement of nearshore

ON THE FOOD OF BROWN TROUT (SALMO TRUTTA M. FARIO) IN THE OPATOVICE WATER SUPPLY RESERVOIR (CZECHOSLOVAKIA), (IN GERMAN),
Brno Univ. (Czechoslovakia). Naturwiss. Fak.
B. Losos.
Zool Listy 25(3), p 275-288, 1976.

Descriptors: *Brown trout, *Trout, *Reservoirs, *Fish diets, *Fish food organisms, Seasonal, Diptera, Mayflies, Stoneflies, Benthic fauna, Daphnia, Littoral, Tributaries, Anisus-leucostomus, Chironomidae, Cladocera, Cloeon-dipterum, Cyclops-strenuus, Czechoslovakia, Daphnia-longispina, Migration, Opatovice, Plecoptera, Radix-peregra, Remnants, Rivulogammarus-fossarum, Salmo-trutta-m-fario, Freshwater shrimps.

In the 2 yr following the filling of the water supply reservoir of Opatovice (Czechoslovakia) (1974-1974), the food was examined in 56 specimens of brown trout. The composition of food showed seasonal changes in connection with the food supply in the environment. The main share fell to the zoobenthos (ranging from 43.5-100%; average, 93.0%), the most frequently occurring component being larvae and pupae of Chironomidae (ranging from 29.2-94.0%; average, 50.6%). Of the above 2 stages of development, the more frequent, except in March 1974, were the pugae which were 5 times as numerous as the larvae throughout the investigation. They became an easy prey of trout, particularly during emergence when they swam towards the water level. From among more benthic forms there occurred Radix peregra (0-65.6%; average, 12.2%), larvae and partly subimagines of the mayfly, Cloeon dipterum (0-67.3%; average, 11.4%), less frequently larvae of stoneflies (Plecoptera: 5.4%), fresh water shrimps, Rivulogammarus fossarum (5.3%), Anisus leucostomus (3.4%) and various species of the genus Sigara (1.7%). The other benthic forms were represented by less than 1% on the average. A large share of torrential forms was found in the food of brown trout. The presence of a great number of littoral forms of zoobenthos in the food confirms the fact that a large part of the brown trout population was distributed in the littoral zone where the trout have many hiding places and abundant suitable and available food.
W78-01631

MAJOR, MINOR, AND TRACE ELEMENTS OF BOTTOM SEDIMENTS IN LAKE DU QUOIN, JOHNSTON CITY LAKE, AND LITTLE GRASSY LAKE IN SGUTHERN ILLINOIS,
Illinois State Geological Survey, Urbana.
For primary bibliographic entry see Field 5A.
W78-01655

INFLUENCE OF VINANSKY LAKE UPON THE FORMATION OF CRUSTACEOPLANKTON IN THE NEW ZEMPLINSKA SIRAVA DAM, (IN GERMAN),
Komenskeho Univ., Bratislava (Czechoslovakia). Katedra Syst. Ekol. Zool.
F. Vilchek.
Acta Fac Rerum Nat Univ Comenianae Zool 21, p 111-118, 1976.

Descriptors: *Zooplankton, *Crustaceans, *Lakes, Copepods, Inflow, Aquatic populations, Dams, Vinansky Lake, Zemplinska-Sirava Dam, Czechoslovakia.

Research on crustaceoplankton in the 1965-1968 revealed that its present state evolved from the initial zoocoenosis being influenced by the inflow of the water from Vinansky Lake and the migration of aquatic birds. The specific composition of Cladocera and Copepods as well as their abundance are more profuse in the dam than in the lake or in the tributary stream.--Copyright 1977 Biological Abstracts, Inc.
W78-01687

2I. Water In Plants

CHANGES IN BIOCHEMICAL AND WATER-PHYSICAL PROPERTIES OF SOILS IRRIGATED WITH MINERALIZED WATER (IN RUSSIAN),
Ukrainian Research Inst. of Agrochemistry and Soil Science, Kharkov (USSR).
For primary bibliographic entry see Field 2G.
W78-01293

EFFECT OF AIR TEMPERATURE AND SOIL HUMIDITY ON THE WATER CONTENT IN GENERATIVE BUDS OF CHERRY AND CULTIVARS WITH DIFFERENT LEVELS OF FROST RESISTANCE (IN RUSSIAN),
Nikita State Botanical Garden, Yalta (USSR).
E. A. Yablonskii.
Fiziol Rast (MOSC) 23(4): 823-828. 1976. English summary.

Descriptors: *Moisture content, *Air temperature, *Soil moisture, *Crop response, Seasonal varia-

bility, Weather patterns, Soil-water-plant relationships.
Identifiers: Cherry, Cultivars, Mazzard, USSR, Crimea.

The total water content was determined in generative buds of cherry and mazzard cherry growing in the South Crimea (USSR) during 1968-1973 from Sept.-Jan. The content did not depend on frost resistance of different cultivars. The effect of air temperature and soil moisture was specific in different cultivars during various years, with a cold or warm winter or with a humid or dry autumn. Resistant cultivars were characterized by a lower response to changes in the hydrothermic regime of the medium as compared to less resistant cultivars.
W78-01343

SPONTANEOUS CHANGES OF TRANSPIRATION UNDER CONSTANT ENVIRONMENTAL CONDITIONS, (IN GERMAN),
Zurich Univ. (Switzerland). Inst. fuer Pflanzenbiologie.
U. Brunner, and M. Eller Benno.
Bull Soc Bot Suisse 85(4), p 289-297, 1975.

Descriptors: *Water vapor, Measurement, Leaves.
Identifiers: *Absorption, Environmental effects, Photometers, *Pipe betle, Roots, Stomata, Temperature, *Transpiration.

Water vapor exchange and absorption of water by the roots of intact single leaf plants of Pipe betle L. were measured simultaneously. Measurements were carried out with a weighable high-sensitivity potometer under controlled environmental conditions. The reliability of the results was secured by 2 independent measurements of the ambient factors during each experiment. The observed values of transpiration and absorption were generally equal. If the roots were not aerated for a long period of time and the whole plant was exposed to higher temperatures, absorption became insufficient and there was a tendency for short noncyclic interruptions of transpiration under unchanging environmental conditions. Truly cyclic variations of transpiration and absorption appeared after a less severe treatment. During these cycles absorption remained sufficient, and a conspicuous phase-shift between loss and uptake of water was observed. The observed phenomena are explained as changes of the stomatal resistance. A connection between the stomatal action and the root resistance is suggested.--Copyright 1977, Biological Abstracts, Inc.
W78-01412

PSYCHROMETRIC ANALYSIS OF TURGOR PRESSURE RESPONSE: A POSSIBLE TECHNIQUE FOR EVALUATING PLANT WATER STRESS RESISTANCE,
Agricultural Research Service, Logan, UT. Crops Research Lab.
D. A. Johnson, and R. W. Brown.
Crop Science, Vol 17, No 4, July-August, 1977, p 507-510, 3 fig, 1 tab, 20 ref.

Descriptors: *Plant tissues, *Drought tolerance, *Drought resistance, *Hygrometry, *Turgidity, *Plant physiology, Arid lands, Semiarid climates, Land reclamation, Soil-water plant relationships, Desert plants, Metabolism, Viability, Water requirements, Plant growth, Growth stages, Soil moisture, Moisture stress.
Identifiers: *Turgor pressure, Psychrometric analysis.

Evaluating plants under water stress is important to programs such as rangeland and mineland rehabilitation, especially in the arid and semiarid west where rehabilitation efforts can be limited if plants with superior drought performance are not selected. Techniques for selecting appropriate plant material should be capable of the following: (1) assessing plant performance at different developmental stages; (2) completion in a short period of time; (3) requiring relatively small quantities of plant materials; (4) examining plant characteristics that integrate a wide array of water stress avoidance and tolerance mechanisms. Psychometric analysis of plant turgor may be one such technique. To determine if differences in turgor pressure response could be correlated with performance during water stress, a study was undertaken of five plant species and hybrids under a range of soil moisture regimes. Water potential components of leaf sample were measured by a psychrometric technique. Predictions of resistance to water stress based on ability to maintain positive turgor closely agreed with field observation. The results suggest that the technique may be useful. (Ullery-Arizona)
W78-01500

DAILY POTENTIAL INTERCEPTION OF RAINFALL BY DIFFERENT FOREST POPULATIONS, (IN FRENCH),
Institut Royal Meteorologique de Belgique, Brussels.
F. Bultot, G. L. Dupriez, and A. Bodeux.
J Hydrol (Amst) 31(3/4), p 381-392, 1976.

Descriptors: *Rainfall intensity, *Evaporation, *Forests, *Interception, Rainfall, *Spruce, *Beech.

On basis of complementary observations, the relationships previously established to estimate potential interception by a spruce forest (Picea abies) and a beech forest (Fagus silvatica) in relation to rainfall, rain intensity and evaporating power of the air were checked. A comparison was then made between the values of the potential interception by spruce forests with different ages.--Copyright 1977, Biological Abstracts, Inc.
W78-01555

ALGAE OF BENTHIC OVERGROWTH IN THE TRANSBAIKALIAN RIVER OF INGODA, (IN RUSSIAN),
Chitinskii Gosudarstvennyi Pedagogichskii Inst. (USSR).
M. I. Kachaeva.
Gidrobiol Zh 12(5), p 68-72, 1976.

Descriptors: *Algae, *Benthic flora, Rivers, Biomass, *Diatoms, *Ingoda River(Russian-SFSR), Seasonal, USSR.

The hydrological indices of the Ingoda River (Russian SFSR, USSR) are characteristic of small mountain rivers in the USSR. A 1969-70 study of its algoflora revealed a rich composition of 241 spp., varieties and forms. A definite regularity in its seasonal dynamics was noted: overgrowth appears in the middle of May and disappears during the prolonged summer high water and during its freezing over period. The most favorable periods for algae development are the 1st half of summer and the 2nd half of fall. The most significant elements of the biomass are green filamentous algae; diatoms comprise an average of 2-3 g/m2 and maximum of 8 m/g2. The highest concentraion of algae is observed in the zone from 0.2-0.5 m deep; with increase of depth and rate of flow the concentration sharply falls.
W78-01557

EFFECT OF WATER DEPTH IN NET CAGES ON THE GROWTH AND BODY SHAPE OF TILAPIA MOSSAMBICA, (IN JAPANESE),
Freshwater Fisheries Research Lab., Tokyo (Japan).
T. Maruyama, and R. Ishida.
Bull Freshw Fish Res Lab (TOKYO) 16 (1), p 11-19, 1976.

Descriptors: *Depth, *Fish, *Growth rates, Nets, Spawning, Deep water, Shallow water, Statistical methods, On-site investigations, Aquatic environment, *Tilapia, Tilapia-Mossambica.

To investigate the adequate water depth to culture T. mossambica 5 groups of fish were reared in net cages of water depth, 50, 75, 100 and 150 cm., and the growth, form and number of spawnings of the caged fish were compared. The fish cultured in deep water showed greater body length and body depth than those of the fish in shallow water. As body depth increases accompanied by growth of body length, significance of the differences between each pair of groups were tested. Variant analysis indicated significant differences among the monthly body lengths and body depths of the groups. The test of the average body length showed a difference between the 150 cm group and the other 4 groups, but no difference among these 4 groups. The test of the corrected average body depth detected a difference among the 5 groups even after the correction for the effects of body length. More frequent spawning was observed in the groups deeper than 75 cm. The 150 cm depth was more suitable for the growth of body length than the shallow depths. Water depths greater than the limit of about 75 cm favored the growth of body length, while shallow water of 25 cm was unsuitable.--Copyright 1977, Biological Abstracts, Inc.
W78-01571

ON CERTAIN THEORETICAL AND PRACTICAL PROBLEMS IN RAISING FISH OF THE MUGILIDAE FAMILY, (IN SERBO-CROATIAN),
Institut za Oceanografiju i Ribarstvo, Split (Yugoslavia).
D. Morovic.
Poljopr Znan Smotr 37(47), p 47-56, 1976.

Descriptors: *Fish diets, *Nutrient requirement, *Aquatic habitats, Environment, Ponds, Fish management, Lagoons, Fish farming.
Identifiers: Liza aurata, Liza ramada, Mugil cephalus, Mugilidae, Yugoslavia.

To study the influence of fish meal on the growth of fishes of the Mugilidae family, raised in fish ponds, nutritional experiments were performed in the juvenile stage of 3 spp. Mugil cephalus, Liza ramada and L. aurata. The results proved unsatisfactory from an economic standpoint. To speed the growth of the young fishes, one must keep them in a natural environment of lagoon canals and add fish meal to the food naturally present.--Copyright 1977 Biological Abstracts, Inc.
W78-01588

2J. Erosion and Sedimentation

NOTES ON SEDIMENTATION ACTIVITIES, CALENDAR YEAR 1973.
Federal Highway Administration, Washington, DC.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-252 376, Price codes: A14 in paper copy, A01 in microfiche. Report to Water Resources Council, Washington, D.C. 1973. 308 p, 3 tab, 2 append.

Descriptors: *Sedimentation, *Research and development, *Projects, Research facilities, Federal government, Sediment transport, Suspended solids, Erosion, Sedimentation rates, Sediments, Sedimentology.

A digest was presented of information furnished by all Federal agencies conducting sedimentation investigations on work in progress or planned, on important findings, on new methods, on new publications, on laboratory and other research activities, and on other pertinent information. The material was organized by major drainage regions in the conterminous United States, Alaska, Hawaii, Puerto Rico, and Foreign. Other major headings included Laboratory and Other Research Activities. An excerpt from the Catalog of Infor-

mation on Water Data, Index to Water Quality Stations, 1973 edition, compiled by the Geological Survey, Office of Water Data Coordination, was included as Appendix A. The excerpt is a list, as of January 1973, of long-term (3 years or more) water quality sites at which sediment data have been collected. Appendix B was a listing of agency addresses by departments where additional information on agency activities can be obtained. (Sims-ISWS)
W78-01185

PROCEEDINGS OF THE FEDERAL INTER-AGENCY SEDIMENTATION CONFERENCE, BUREAU OF RECLAMATION, DENVER, COLORADO, MAY 6-8, 1947.
For primary bibliographic entry see Field 4D.
W78-01188

EROSION BY IMPINGING CIRCULAR TURBULENT JETS,
Alberta Univ., Edmonton. Dept. of Civil Engineering.
N. Rajaratnam, and S. Beltaos.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 103, No HY10, Proceedings Paper 13287, p 1191-1205, October 1977. 13 fig, 1 tab, 16 ref, 2 append.

Descriptors: *Jets, *Turbulence, *Erosion, Hydraulic models, Hydraulics, Model studies, Flow, Equations, Mathematical studies, Sands, Froude number.
Identifiers: *Impingement, Turbulent jets, Similarities, Submerged jets, Impingement height, Polystyrene.

Described was an experimental study of the erosion of loose beds of sand and polystyrene by impinging (submerged) jets of air and water. The maximum depth of erosion increases linearly with the logarithm of time up to a characteristic time value beyond which the variation becomes nonlinear and eventually approaches an asymptotic state. For large impingement heights, the asymptotic values of the maximum depth and radius of erosion in terms of the impingement height were found to be mainly functions of the densimetric Froude number divided by the impingement height in terms of the diameter of the jet at the nozzle. Some correlations also were found for small impingement heights. The geometric form of the eroded bed profile, in the unsteady as well as in the asymptotic state, was found to be similar. (Lee-ISWS)
W78-01284

ERODIBILITY OF COARSE SAND-CLAYEY SILT MIXTURES,
Lehigh Univ., Bethlehem, PA. Dept. of Civil Engineering.
W. A. Murray.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 103, No HY10, p 1222-1227, October 1977. 3 fig, 1 tab, 7 ref, 1 append. NSF OIP74-20724.

Descriptors: *Laboratory tests, *Erosion, *Cohesive soils, Sediments, Stream beds, Sand, Silts, Clays, Stream erosion, Sediment transport, Analytical techniques, Measurement.
Identifiers: Soil mixtures.

This paper presented results of a laboratory study concerning the erosion characteristics of soil mixtures composed of a uniform coarse sand mixed with various percentages of a silty soil. Tests were conducted in a flume constructed of plexiglass, 152 cm long, 11 cm wide, and 11 cm deep, with a headbox and a tailbox. The sediment bed was observed closely during any given test series to ensure that excessive erosion that would appreciably change the average bed elevation of the test section did not occur. From the experimental study results of the erodibility of coarse sand-clayey silt mixtures, the following conclusions may be drawn: (1) The sediment transport rate for all sediment samples increased as the 16th power of the bed shear stress. (2) The bed shear stress necessary to attain a given rate of sediment transport increased as the percentage of fine material increased in the soil sample. However, the rate of increase with percentage fines was less than previously reported. (3) It appears that pursuing this type of experimental analysis will shed light on the overall problem of predicting the erodibility of cohesive soils. (Humphreys-ISWS)
W78-01285

AN EROSION EQUATION DERIVED FROM BASIC EROSION PRINCIPLES,
Purdue Univ., Lafayette, IN. Dept. of Agricultural Engineering.
G. R. Foster, L. D. Meyer, and C. A. Onstad.
Transactions of the American Society of Agricultural Engineers, Vol. 20, No. 4, p 678-682, July-August 1977. 28 ref.

Descriptors: *Soil erosion, *Watersheds(Basins), *Theoretical analysis, *Mathematical models, Rill erosion, Sediment transport, Sediment yield, Sheet erosion, Erosion, Equations, Overland flow, Runoff, Rainfall, Erosion control, Land management, Shear stress.
Identifiers: Interrill erosion.

An erosion equation was derived from the continuity equation for sediment transport and other basic equations describing rill and interrill erosion. The resulting equation is a useful model for explaining the behavior of the erosion process. The equation might serve as the basis for an operational equation for estimating soil loss for specific storms. (Humphreys-ISWS)
W78-01295

A RUNOFF EROSIVITY FACTOR AND VARIABLE SLOPE LENGTH EXPONENTS FOR SOIL LOSS ESTIMATES,
Purdue Univ., Lafayette, IN. Dept. of Agricultural Engineering.
G. R. Foster, L. D. Meyer, and C. A. Onstad.
Transactions of the American Society of Agricultural Engineers, Vol. 20, No. 4, p 683-687, July-August 1977. 1 tab, 15 ref.

Descriptors: *Soil erosion, *Sediment yield, *Watersheds(Basins), *Mathematical models, Equations, Erosion, Sheet erosion, Rill erosion, Runoff, Estimating, On-site tests, Slopes, Analysis.
Identifiers: Erosivity, Runoff erosivity, Rainfall erosivity, Interrill erosion, Universal Soil Loss Equation.

A runoff erosivity term was developed for the Universal Soil Loss Equation (USLE) from analysis of an erosion equation derived from basic erosion principles. The accuracy of erosion estimates for individual storms can be improved significantly by using a soil loss equation having separate terms for rill and interrill erosion. Also, such an equation can be used to estimate the amount of sediment from different slope segments and also the amount from the soil surface and from deeper within the soil profile. The analyses showed the potential of estimating soil loss using separate rill erosion and interrill erosion terms in an erosion equation. Research is needed to define precisely the relationship between rill erosion and runoff erosivity and that between interrill erosion and rainfall erosivity. The separate effects of cover, management, and supporting practices on rill and interrill erosion need to be estblished. The achievement of the mentioned goals promises to provide a flexible, useful, and accurate erosion equation based on sound erosion principles. In the meantime, basic erosion principles can be used as guidelines to adjust parameters in the USLE for more accurate soil loss estimates for specific time periods and situations. (Humphreys-ISWS)
W78-01296

RUNOFF AND EROSION CHARACTERISTICS OF SURFACE-MINED SITES IN WESTERN NORTH DAKOTA,
North Dakota State Univ., Fargo. Dept. of Agricultural Engineering.
J. E. Gilley, G. W. Gee, W. O. Willis, and R. A. Young.
Transaction of the American Society of Agricultural Engineers, Vol. 20, No. 4, p 697-700, 704, July-August 1977. 1 fig, 3 tab, 9 ref.

Descriptors: *Runoff, *Erosion, *North Dakota, Soil erosion, Sedimentation, Hydrology, Strip mines, Grasslands, Mulching, Rainfall simulators, Agriculture.
Identifiers: Universal Soil Loss Equation, Straw mulch.

A rainfall simulator was used to measure runoff and erosion from rangeland, spoil, and topsoil sites. Measured soil losses were greatest on bare topsoil plots and least on the non-cultivated rangeland site. Application of a straw mulch reduced erosion on topsoil by over 90%. However, the measured erosion and runoff values from the mulched topsoil sites were still over 50% higher than from the rangeland site. (Lee-ISWS)
W78-01298

LOCAL SCOUR AROUND CYLINDRICAL PIERS,
Waterloopkundig Lab., Delft (Netherlands).
For primary bibliographic entry see Field 8B.
W78-01300

PREPARATIVE-SCALE SIZE FRACTIONATION OF SOILS AND SEDIMENTS AND AN APPLICATION TO STUDIES OF PLUTONIUM GEOCHEMISTRY,
Argonne National Lab., IL. Radiological and Environmental Research DiV.
R. N. Muller, and G. T. Tisue.
Soil Science, Vol 124, No 4, p 191-198, October 1977. 8 fig, 5 tab, 19 ref.

Descriptors: *Separation techniques, *Soils, *Sediments, *Geochemistry, Particle size, Sediment transport, Laboratory equipment, Setting velocity, Histograms, Erosion.
Identifiers: *Physical fractionation, Elutriation, *Plutonium.

A modified elutriation procedure for the physical separation of soils and sediments based on particle size was described. The size distribution of fractions obtained by the described method was verified directly and indicated that acceptable separation of silts and clays may be obtained. Studies of plutonium distribution with particle size indicated that the greatest concentrations are in the smaller size classes, which are most subject to erosional transport. (Visocky-ISWS)
W78-01301

TIME SCALES AND DYNAMIC MODELS OF DEEP-SEA SEDIMENTATION,
Rosenstiel School of Marine and Atmospheric Science, Miami, FL. Div. of Marine Geology and Geophysics.
For primary bibliographic entry see Field 2L.
W78-01303

DETERMINATION OF TRACE ELEMENT CONTAMINATION OF SEDIMENTS BY MULTIELEMENT ANALYSIS OF CLAY-SIZE FRACTION,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 2H.
W78-01311

EVALUATION OF SEDIMENT CONTROL DAMS,
Pennsylvania Dept. of Transportation, Harrisburg. Bureau of Materials, Testing and Research.

For primary bibliographic entry see Field 4D.
W78-01313

ACOP PUMPING SAMPLER. ALLUVIAL RIVER MECHANICS PROJECT,
Colorado State Univ., Fort Collins. Engineering Research Center.
For primary bibliographic entry see Field 4D.
W78-01314

CONTROL OF EROSION AND SEDIMENT DEPOSITION FROM CONSTRUCTION OF HIGHWAYS AND LAND DEVELOPMENT,
Environmental Protection Agency, Washington, DC. Office of Water Programs.
For primary bibliographic entry see Field 4D.
W78-01315

POLLUTION STUDIES OF TRACE ELEMENTS IN SEDIMENTS FROM THE UPPER SARONIKOS GULF, GREECE,
Democritus Nuclear Research Center, Athens (Greece). Chem. Dept.
For primary bibliographic entry see Field 5B.
W78-01474

ADJUSTMENT TO QUATERNARY CLIMATIC CHANGE BY THE COLORADO RIVER IN CENTRAL TEXAS,
Texas Univ. at Austin. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2E.
W78-01504

USE OF HEAVY METAL POLLUTION IN SANDUSKY BAY SEDIMENTS TO DETERMINE SEDIMENTATION RATES,
Bowling Green State Univ., OH. Dept. of Geology.
For primary bibliographic entry see Field 5B.
W78-01533

HYDRAULIC SENSOR INSTRUMENTATION OF A SHORE FACE IN A TIDAL CURRENT CONVERGENCE ZONE--CAPE HENRY, VIRGINIA,
Old Dominion Univ., Norfolk, VA. Inst. of Oceanography.
For primary bibliographic entry see Field 2L.
W78-01536

GROIN LENGTH AND THE GENERATION OF EDGE WAVES,
Oregon State Univ. Corvallis. School of Oceanography.
For primary bibliographic entry see Field 8B.
W78-01538

CHANGES DUE TO JETTIES AT TILLAMOOK BAY, OREGON,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 8B.
W78-01539

STUDIES ON THE FIXATION OF DRIFTING SAND: 3. RELATION BETWEEN SAND SURFACE MOISTURE CONTENT AND DRIFTING SAND, (IN JAPANESE),
Tottori Univ. (Japan). Faculty of Agriculture.
For primary bibliographic entry see Field 2L.
W78-01585

EROSION BY CIRCULAR TURBULENT WALL JETS,
Alberta Univ., Edmonton. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W78-01634

HELLEY-SMITH BED LOAD SAMPLERS,
Agricultural Research Service, Boise, ID.
C. W. Johnson, R. L. Engleman, J. P. Smith, and C. L. Hanson.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 103, No HY10, p 1217-1221, October 1977. 2 fig, 1 tab, 9 ref, 1 append.

Descriptors: *Bed load samplers, *Sampling, *Idaho, *On-site investigations, Instrumentation, Demonstration watersheds, Equipment, Sediment transport, Sediments, *Sediment load, On-site tests, Testing, Testing procedures, Measurement.
Identifiers: *Reynolds Creek Experimental Watershed(Idaho), Helley-Smith samplers.

This paper reported recent findings and experiences in using Helley-Smith bed load samplers in streams on the Reynolds Creek Experimental Watershed in southwest Idaho. Equipment and procedures developed in sampling during peak streamflow events were described. The 90-sq mile sagebrush rangeland watershed, with a main stream length of 16 miles (25.7 km), an elevation difference of 3,700 ft (1,130 m), and average streamflow rate of 21.5 cfs, is characterized by steep gravel-boulder streambeds with many outcrops of basalt and granite. The streams transport large quantities of sediment during rainfall and snowmelt events. Users of Helley-Smith bed load samplers, under conditions of high organic and sediment transport, should recognize the possible sampling error caused by clogging of standard sampler bags and instead use either larger bags or bags with a mesh larger than 0.2 mm. The samplers with standard small 0.2-mm mesh bags clogged very easily and drastically affected the sediment catch. The large sampler bags with 930 sq in of bag area, instead of 340 sq in caused no sampler operation problems and allowed sampling for longer periods to obtain larger samples. Large 0.2-mm mesh bags are recommended for most uses. (Humphreys-ISWS)
W78-01641

MAJOR, MINOR, AND TRACE ELEMENTS OF BOTTOM SEDIMENTS IN LAKE DU QUOIN, JOHNSTON CITY LAKE, AND LITTLE GRASSY LAKE IN SOUTHERN ILLINOIS,
Illinois State Geological Survey, Urbana.
For primary bibliographic entry see Field 5A.
W78-01655

SOIL EROSION AND DUST CONTROL ON ARIZONA HIGHWAYS. PART IV: FINAL REPORT-FIELD TESTING PROGRAM,
Arizona Transportation and Traffic Inst., Tucson.
For primary bibliographic entry see Field 4D.
W78-01658

2K. Chemical Processes

RESEARCH ON UNDERGROUND WATERS: 27. STUDY OF AN EPIKARSTIC AQUIFER OF THE CORBIERES (OPOUL, PYRENEES-ORIENTALES) (IN FRENCH),
For primary bibliographic entry see Field 2F.
W78-01192

CARBON DIOXIDE IN THE ATMOSPHERE OF THE UNSATURATED ZONE: AN IMPORTANT CONTROL OF GROUNDWATER HARDNESS IN LIMESTONES,
University of East Anglia, Norwich (England). School of Environmental Sciences.
For primary bibliographic entry see Field 2F.
W78-01289

PREPARATIVE-SCALE SIZE FRACTIONATION OF SOILS AND SEDIMENTS AND AN APPLICATION TO STUDIES OF PLUTONIUM GEOCHEMISTRY,
Argonne National Lab., IL. Radiological and Environmental Research DiV.
For primary bibliographic entry see Field 2J.
W78-01301

ANNUAL BOOK OF ASTM STANDARDS. PART 31. WATER.
American Society for Testing and Materials, Philadelphia, PA.
For primary bibliographic entry see Field 5A.
W78-01576

2L. Estuaries

SOME ASPECTS OF PUGET SOUND'S CIRCULATION AND WATER PROPERTIES,
Washington Univ., Seattle. Dept. of Oceanography.
C. A. Barnes, and C. C. Ebbesmeyer.
Report M76-36 to NOAA Environmental Research Laboratories, 1976. 44 p, 9 fig, 1 tab, 51 ref.

Descriptors: *Estuaries, *Circulation, *Tidal effects, Washington, Sounds, Stratification, Water circulation.
Identifiers: *Puget Sound(Wash).

Using Puget Sound, this study illustrates that estuarine circulation may be quite vigorous at all depths where tides provide sufficiently deep tidal mixing and pumping. Puget Sound is a complex system of interconnected estuarine types. Its two main arms are fjords: in the first (Whidbey Basin) mixing is insufficient to break down the near surface stratification zone except in a shallow secondary channel in which the net flow is seaward at all depths; in the second (Puget Sound Main Basin) flood tides 'pump' deep water upwards and mix it with surface water through a 44m depth constriction located in a sill zone leading to a smaller terminal basin. On ebb, mixed water returns rapidly to mid-basin via a secondary channel. Blocking either the terminal or secondary channel in a tidal model greatly slowed the circulation in the Main Basin, demonstrating the marked effect of geometry and bathymetry on transport. Although most of Puget Sound's runoff empties into Whidbey Basin, its transport is about an order of magnitude less than in the Main Basin. Analysis of current records and water properties suggests that water depth travels from mouth to head of the Main Basin in approximately two weeks contrasted to a few months in Whidbey Basin. (NOAA)
W78-01273

RECOMMENDATIONS FOR MICROBIOLOGICAL STUDIES IN THE CONTINENTAL SHELF AREAS. RESULTS FROM TWO WORKSHOPS CONVENED 10-11 AUGUST 1976 AND 19-20 OCTOBER 1976 IN BOULDER, COLORADO. OUTER CONTINENTAL SHELF ENVIRONMENTAL ASSESSMENT PROGRAM.
National Oceanic and Atmospheric Administration, Boulder, CO. Marine Ecosystems Analysis Program.
For primary bibliographic entry see Field 5C.
W78-01274

FIELD STUDIES ON BENTHIC COMMUNITIES IN THE NEW ENGLAND OFFSHORE MINING ENVIRONMENTAL STUDY (NOMES),
New Hampshire Univ., Durham.
For primary bibliographic entry see Field 5C.
W78-01275

REVIEW OF EXISTING INFORMATION ON FISHES IN THE DEEP OCEAN MINING EN-

VIRONMENTAL STUDY (DOMES) AREA OF THE TROPICAL PACIFIC,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
For primary bibliographic entry see Field 5C.
W78-01276

PHYTOPLANKTON AND PRIMARY PRODUCTIVITY STUDIES; PRELIMINARY REPORT,
Texas A and M Univ., College Station. Dept. of Oceanography.
For primary bibliographic entry see Field 5C.
W78-01278

DISTRIBUTION AND COMPOSITION OF THE SUSPENDED PARTICULATE MATTER IN THE WATERS OF THE DOMES REGION,
National Oceanic and Atmospheric Administration, Seattle, WA. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 5B.
W78-01279

STUDIES ON SALINIZATION OF GROUNDWATER, 1. THEORETICAL CONSIDERATION ON THE THREE-DIMENSIONAL MOVEMENT OF THE SALT WATER INTERFACE CAUSED BY THE PUMPAGE OF CONFINED GROUNDWATER IN FAN-SHAPED ALLUVIUM,
Ehime Univ., Matsuyama (Japan). Dept. of Applied Physics.
For primary bibliographic entry see Field 2F.
W78-01287

TIME SCALES AND DYNAMIC MODELS OF DEEP-SEA SEDIMENTATION,
Rosenstiel School of Marine and Atmospheric Science, Miami, FL. Div. of Marine Geology and Geophysics.
J. R. Southam, and W. W. Hay.
Journal of Geophysical Research, Vol 82, No 27, p 3825-3842, September 20, 1977. 12 fig, 7 tab, 29 ref. NSF DES74-02825 A0Y.

Descriptors: *Sedimentation, *Oceans, *Model studies, Mathematical models, Sediments, Chemicals, Geochemistry, Geology, Biological properties, Oceanography.

Models of very long-term geochemical cycling of material include oceanic sediments as a part of the much larger system of mantle differentiation, production of sea floor, subduction, and continental growth. Mass balance considerations show that the system cannot be in steady-state if pelagic sediment has always had its present composition. An approximate steady-state system is possible if pelagic sediments were exclusively red clay and siliceous ooze. The origin of the calcareous plankton 100 millions of years ago apparently initiated a process interior to the system which is driving the system toward a new steady-state. On a time scale of tens of millions of years, sea level fluctuations associated with changes in the length of oceanic ridges and the rate of spreading cause differential partitioning of sediments between shelf areas and the oceanic realm. This process may alter the inputs to the ocean system and may affect both the volume and the composition of oceanic sediment. for shorter time scales, the sedimentary record reflects variations in internal processes of the ocean system. (Sims-ISWS)
W78-01303

BOTTOM NEPHELOID LAYERS AND BOTTOM MIXED LAYERS OBSERVED ON THE CONTINENTAL SHELF OFF OREGON,
Oregon State Univ., Corvallis. School of Oceanography.
H. Pak, and J. R. V. Zaneveld.
Journal of Geophysical Research, Vol 82, No 27, p 3921-3931, September 20, 1977. 10 fig, 3 tab, 21 ref. ONR N00014-57-0369-0007.

Descriptors: *Continental shelf, *Profiles, *On-site investigations, *Pacific Ocean, *Oregon, Temperature, Water temperature, Conductivity, Salinity, Depth, Transmissivity, Light, Frequency analysis, Upwelling, Sediment transport, Oceans, Oceanography.
Identifiers: *Bottom mixed layers, *Bottom nepheloid layers.

One hundred and seventy pairs of temperature and light transmissiion profiles were obtained by simultaneous conductivity-temperature-depth (CTD) and light transmissometer casts in three cruises on the R/V Yaquina over the continental shelf off Oregon. The data were analyzed for bottom nepheloid layers (BNL) and bottom mixed layers (BML). Supplementing the data were 1,177 CTD profiles taken during the Coastal Upwelling Ecosystems Analysis (Cuea) program and time series current data obtained under the Winter-Spring Transition Experiment on the Oregon Continental Shelf program. Frequencies of BML occurrences obtained from Cuea data taken during July and August 1972 and July and August 1973 were 52.9 and 53.3% for the respective years. Frequency of BNL occurrences for each of the three Yaquina cruises was consistently higher than that of BML. Large temporal variations in bottom layers are attributed to advection of different water types there. Frequency of BNL and NML clearly is associated with coastal upwelling intensities; under intense coastal upwelling, BNL and BML tend to be dissipated, and under weak coastal upwelling, they tend to be thick. (Sims-ISWS)
W78-01305

WIND STRESS AND ROUGHNFSS LENGTH OVER BREAKING WAVES,
New South Wales Univ., Kensington (Australia). Dept. of Theoretical and Applied Mechanics.
W. K. Melville.
Journal of Physical Oceanography, Vol 7, No 5, p 702-710, September 1977. 5 fig, 32 ref. NSF OCE74-23791.

Descriptors: *Waves(Water), *Winds, *Model studies, Mathematical models, Roughness(Hydraulic), Stress, Turbulence, Friction, Fluid friction, Drag, Air-water interfaces, Oceans, Oceanography.
Identifiers: Breaking waves, Roughness length.

The effects of surface wave breaking on the adjacent atmospheric boundary layer were examined. It was argued that the transition from aerodynamically smooth to rough flow in a neutral atmosphere corresponds to the onset of extensive small-scale wave breaking. The association of wave breaking with the generation of turbulence in the boundary layer above leads to the result that the friction velocity is approximately equal to the phase velocity of the breaking waves. It was argued that this approximate relationship holds even when the small-scale breaking waves are riding on a swell. The existence of a minimum phase velocity for surface waves then requires that there be a minimum friction velocity, in the neighborhood of 23 cm/s, below which rough flow cannot occur. A result of Phillips and Banner which described the limiting amplitude of small gravity waves under the action of wind drift and swell was used to derive a relationship between the roughness length and friction velocity which is a generalization of Charnock's equation. The published field measurements of a number of workers were shown to support these results. (Sims-ISWS)
W78-01308

STATE HAS TITLE TO FORESHORES OF GEORGIA'S NAVIGABLE WATERS,
For primary bibliographic entry see Field 6E.
W78-01348

COASTAL RESOURCE USE - DECISIONS ON PUGET SOUND,
Washington Univ., Seattle. Sea Grant Program.
For primary bibliographic entry see Field 6G.
W78-01355

COASTAL ZONE MANAGEMENT IN HAWAII,
Hawaii State Dept. of Planning and Economic Development, Honolulu.
For primary bibliographic entry see Field 6E.
W78-01367

POLLUTION STUDIES OF TRACE ELEMENTS IN SEDIMENTS FROM THE UPPER SARONIKOS GULF, GREECE,
Democritus Nuclear Research Center, Athens (Greece). Chem. Dept.
For primary bibliographic entry see Field 5B.
W78-01474

HYDRAULIC SENSOR INSTRUMENTATION OF A SHORE FACE IN A TIDAL CURRENT CONVERGENCE ZONE--CAPE HENRY, VIRGINIA,
Old Dominion Univ., Norfolk, VA. Inst. of Oceanography.
J. C. Ludwick, and P. B. Johnson.
Technical Report No. 25, June 1977, 179 p. NOAA Grant-04-4-022-17.

Descriptors: *Erosion, *Instrumentation, *Sediment transport, *Bottom sediments, *Sedimentation, Virginia, Tidal effects, Coasts.
Identifiers: Virginia Beach(VA), Convergence zone, Tidal currents.

This study deals with whether coastal currents are competent to erode unconsolidated and semiconsolidated sediments of sand size on the inner continental shelf. The basic data gathering technique employs a rigid instrument platform installed on the sea floor. An armored cable is used to transmit sampled data to recording instruments on shore. The advantages and disadvantages of this system are compared with conventional techniques of using surface vessels, radio-link buoys, and self-contained recording and storage within the sensor housing for periodic retrieval. The design, operation, and installation of the measurement system are discussed in detail. The second part of this report presents results of a study of jet-like coastal currents and bottom sediment transport off Virginia Beach, Virginia. (NOAA)
W78-01536

THE USE OF UNDERWATER EQUIPMENT IN FRESHWATER RESEARCH.
Virginia Polytechnic Inst. and State Univ. Blacksburg.
For primary bibliographic entry see Field 7B.
W78-01537

GROIN LENGTH AND THE GENERATION OF EDGE WAVES,
Oregon State Univ. Corvallis. School of Oceanography.
For primary bibliographic entry see Field 8B.
W78-01538

CHANGES DUE TO JETTIES AT TILLAMOOK BAY, OREGON,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 8B.
W78-01539

COMPARISON OF COMPUTER SIMULATION MODELS WITH FIELD DATA FROM NEARSHORE ENVIRONMENTS,
Williams Coll. Williamstown, MA.
For primary bibliographic entry see Field 2H.
W78-01543

WATER RESOURCES PLANNING FOR RIVERS DRAINING INTO MOBILE BAY: A USERS' MANUAL FOR THE TWO DIMENSIONAL HYDRODYNAMIC MODEL,
Alabama Univ., University. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5B.
W78-01544

CHEMICAL COMPOSITION OF SEAWEED IN THE COASTAL WATERS OF THE BLACK SEA (UKRAINIAN SSR), (IN RUSSIAN),
Odessa Technological Inst. (USSR).
M. S. Dudkin, I. V. Areshidze, and G. D. Lukina.
Rastit Resur 12(1), p 133-137, 1976.

Descriptors: Coasts, Mineralogy, *Nitrogen, Copper, Trace elements, *Black Sea, *Carbohydrates, Chemical properties, *Potamogeton-pectinatus, *Protein, *Ruppia-spiralis, Ukrainian-SSR, USSR, Vitamin, *Sosteria-marina, *Sea weed.

Zosteria marina, Ruppia spiralis, and Potamogeton pectinatus growing in the coastal waters of the Black Sea (USSR) were found to be rich in carbohydrates (46-51.6%), N compounds (52.20-56.54%), and raw protein (11.31-14%), as well as several trace elements, mainly Mn (0.5%) and Cu (0.05%), macroelements. The sugar content was 2.3%. The vitamin B1 level was 1.13-1.26 micro-g/g of raw material. Based on their chemical composition and availability, consideration of these seaweeds as prospective raw material for industrial use was indicated.--Copyright 1977, Biological Abstracts, Inc.
W78-01560

THE EFFECT OF ANAEROBIOSIS ON MEASUREMENT OF SULFITE PULP MILL EFFLUENT CONCENTRATION IN ESTUARINE WATER BY U.V. SPECTROPHOTOMETRY,
Fisheries and Marine Service, St. Andrews (New Brunswick).
For primary bibliographic entry see Field 5A.
W78-01577

STUDIES ON THE FIXATION OF DRIFTING SAND: 3. RELATION BETWEEN SAND SURFACE MOISTURE CONTENT AND DRIFTING SAND, (IN JAPANESE),
Tottori Univ. (Japan). Faculty of Agriculture.
M. Nishikawa, K. Tanaka, and S. Ikeda.
Bull Tottori Univ For 8, p 63-82, 1975.

Descriptors: *Sands, *Moisture content, Sand dunes, Wind velocity, Erosion.
Identifiers: Ammophilia-breviligulata, *Wet sands, *Drifting sands.

Drifting wet sand disasters on the coastal sand-dunes by the Japan sea occur with the rain and snow fall of a hard monsoon. The drifting sand on the wet sandy surface soil was studied to determine a method for the fixation of drifting sand on the coastal sand-dune. The relation between sand surface moisture content and the threshold wind velocity of drifting sand was studied using a wind tunnel. Sand surface moisture content, wind velocity and the quantity of drifting sand at Fushino in the Koyama Sand-dune from Dec. 1973 to April 1974 were investigated. There was a rectilineal relation between the sand surface moisture content and the threshold wind velocity of drifting sand. Sand surface moisture content indicated an air-dried condition below 1% and a possibility of drifting sand after several hours if a hard wind blew, even in the case of rainfall. Drifting sand originated at a mean speed of 6-8 m/s at a height of 1 m above ground, with a below sand surface moisture content of below 1%; toward 0.3% the quantity of drifting sand increased abruptly in proportion as the wind speed increased. Drifting sand originated at a mean speed of 15.8 m/s, a height of 1 m above ground and with a below sand surface moisture content of about 6% during rainfall. Its quantity grew nearly to the same volume as in the case of the air-dried sand. The quantity of drifting sand at a place covered with American beachgrass (Ammophila brevigulata Fern.) was about 1/800 of that on bare land. This planting place showed the remarkable effect of fixation of drifting sand.--Copyright 1977 Biological Abstracts, Inc.
W78-01585

PROCEEDINGS OF THE NASA EARTH RESOURCES SURVEY SYMPOSIUM, JUNE 1975, TECHNICAL SESSION PRESENTATIONS, LAND USE-MARINE RESOURCES, VOLUME I-C.
National Aeronautics and Space Administration, Houston, TX. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7B.
W78-01589

THE SIGNIFICANCE OF THE SKYLAB ALTIMETER EXPERIMENT-RESULTS AND POTENTIAL RESULTS,
Battelle Columbus Labds., OH.
For primary bibliographic entry see Field 7B.
W78-01605

A COMPARISON OF SKYLAB S-193 AND AIRCRAFT VIEWS OF SURFACE ROUGHNESS AND A LOOK TOWARD SEASAT,
National Oceanic and Atmospheric Administration, Miami, FL. Atlantic Oceanographic and Meteorological Labs.; National Oceanic and Atmospheric Administration, Miami, FL. Sea-Air Interaction Lab.
D. Ross.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 1911-1936, September 1975. 16 fig, 18 ref.

Descriptors: *Remote sensing, *Waves(Water), *Oceans, Analytical techniques, Analysis, Surveys, Instrumentation, Measurement, Electronic equipment, Winds, Wind velocity, Satellites(Artificial), Aircraft, Rainfall, Hurricanes.
Identifiers: Skylab, Seasat.

An extensive aircraft underflight program was conducted along the Skylab groundpath for the purpose of documenting wind, wave, and atmospheric conditions affecting the amplitude of the active and passive microwave signatures. The S-193 microwave system senses a roughness parameter at the ocean surface that is proportional to the surface windspeed. The exact relationship between the wind and the roughness parameter is the subject of continuing investigations. The Skylab S-193 experiment has proved that active and passive microwave sensors can be used to infer surface winds but are subject to scatter and a decreasing sensitivity with increasing windspeed in the case of the active radar, and bias due to rainfall with little sensitivity to lower windspeeds in the case of passive microwave signatures. These results, therefore, suggest that combined active and passive systems with a weighted averaging process (employing polarization dependencies) being used to infer the local wind reduce some of the scatter due to random errors and should be tested with Skylab data. The results further suggest that a parameterization of the wave spectrum may be necessary in order to further reduce the scatter in radar backscattering cross sections. The Skylab data set contains most of the data needed to test these hypotheses and could lead to satellite determination of both the windspeed and surface wave spectrum by judicious use of active and multifrequency passive microwave systems. (See also W78-01589) (Humphreys-ISWS)
W78-01606

SKYLAB S-193 RADSCAT MICROWAVE MEASUREMENTS OF SEA SURFACE WINDS,
Kansas Univ./Center for Research, Inc. Lawrence. Remote Sensing Lab.
R. K. Moore, A. K. Fung, J. Young, J. Claassen, and H. Chan.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 1937-1952, September 1975. 11 fig, 7 ref.

Descriptors: *Wind velocity, *Remote sensing, *Oceans, Microwaves, Measurement, Dispersion, Frequency, Analysis, Satellites(Artificial), Temperature, Rain, Monitoring, Winds, Surfaces.
Identifiers: Skylab.

The small-scale roughness of the sea surface is known to be in equilibrium with the local winds near the surface. Because radar backscatter and microwave emissions are sensitive to surface roughness, they are highly correlated with sea surface winds. The radiometric measurements are more sensitive to variations in the atmosphere than are the backscatter measurements. The simultaneous collection of the two measurements permits most atmospheric effects to be removed from the data. The S-193 Radscat made extensive measurements of many sea conditions. The equivalent 20 meter-elevation wind speeds range from calm to over 30 meters/sec. Measurements were taken in a tropical hurricane (Ava), a tropical storm (Christine), and in portions of extratropical cyclones. Other surface parameters investigated for correlation with the measurements included sea temperature, air/sea temperature difference, and gravity-wave spectrum. The gravity-wave spectrum was estimated from numerical wave specification theories. Regression analysis was used to determine empirically the relation between surface parameters and the microwave measurements, after correction for atmospheric effects. Results indicate a relationship approaching square-law at 50 deg between differential scattering coefficient and wind speed with horizontally polarized scattering data showing slightly more sensitivity to wind speed than vertically polarized data. These results agree well with theory and show that sea surface winds can be measured accurately from space. (See also W78-01589) (Humphreys-ISWS)
W78-01607

A PROCEDURE FOR ESTIMATION OF SEA-SURFACE TEMPERATURE FROM REMOTE MEASUREMENTS IN THE 10-13 MICROMETER SPECTRAL REGION,
Science Applications, Inc., La Jolla, CA.
D. C. Anding.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 1953-1972. September 1975. 8 fig, 12 ref.

Descriptors: *Water temperature, *Oceans, *Remote sensing, *Oceanography, Surfaces, Temperature, Satellites(Artificial), Instrumentation, Measurement, Infrared radiation, Analytical techniques, Theoretical analysis, Radiation.
Identifiers: Skylab.

This paper demonstrated the feasibility of procedure for the remote measurement of sea surface temperature which inherently corrects for the effect of the intervening atmosphere without recourse to climatological data. The procedure relies upon the near-linear differential absorption properties of the infrared window region between 10 and 13 micrometers and requires radiometric measurements in a minimum of two spectral intervals within the infrared window which have a significant difference in absorption coefficient. The procedure was applied to Nimbus 4 infrared inter-

ferometer spectrometer data and to Skylab EREP S191 spectrometer data, and it was demonstrated that atmospheric effects on the observed brightness temperature can be reduced to less than 1.0 Kelvin. The technique is likely to produce a significant benefit for unusual conditions, such as warm moist atmospheres over cool waters, or vice versa, when climatological data would yield a particularly poor result. (See also W78-01589) (Humphreys-ISWS)
W78-01608

OCEAN COLOR IMAGERY- COASTAL ZONE COLOR SCANNER,
National Aeronautics and Space Administration, Greenbelt, MD. Goddard Space Flight Center.
For primary bibliographic entry see Field 5A.
W78-01610

SKYLAB INVESTIGATION OF THE UPWELLING OFF THE NORTHWEST COAST OF AFRICA,
Delaware Univ., Newark. Coll. of Marine Studies.
K. H. Szekielda, D. J. Suszkowski, and P. S. Tabor.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No. NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 2005-2021, September 1975. 11 fig, 12 ref. NASA NAS9-13344.

Descriptors: *Remote sensing, *Upwelling, *Oceans, *Africa, Coasts, Water temperature, Water properties, Plankton, Distribution, Chlorophyll, Color, Spectroscopy, Sediment distribution, Suspended solids, Monitoring, Instrumentation.
Identifiers: *Cape Blanc(Africa), Skylab.

The upwelling off the NW coast of Africa in the vicinity of Cape Blanc was studied in February - March 1974 from aircraft and in September 1973 from Skylab. The aircraft study was designed to determine the effectiveness of a differential radiometer in quantifying surface chlorophyll concentrations. Results of the aircraft study indicated that the two-channel, ratio approach is ineffective in determining surface chlorophyll concentrations and should not be used in future studies. Photographic images of the S190A Multispectral Camera and the S190B Earth Terrain Camera from Skylab were used to study distributional patterns of suspended material and to locate ocean color boundaries. The thermal channel of the S192 Multispectral Scanner was used to map sea-surface temperature distributions offshore of Cape Blanc. Correlating ocean color changes with temperature gradients is an effective method of qualitatively estimating biological productivity in the upwelling region off Africa. (See also W78-01589) (Humphreys-ISWS)
W78-01611

THE FEASIBILITY OF UTILIZING REMOTELY SENSED DATA TO ASSESS AND MONITOR OCEANIC GAMEFISH,
For primary bibliographic entry see Field 7B.
W78-01612

LANDSAT DIGITAL DATA PROCESSING - A NEAR REAL-TIME APPLICATION,
National Aeronautics and Space Administration, Greenbelt, MD. Goddard Space Flight Center.
For primary bibliographic entry see Field 7B.
W78-01613

NEARSHORE COASTAL MAPPING,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 7C.
W78-01614

QUANTITATIVE SUSPENDED SEDIMENT MAPPING USING AIRCRAFT REMOTELY SENSED MULTISPECTRAL DATA,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
For primary bibliographic entry see Field 7B.
W78-01615

REMOTE SENSING OF SALINITY,
National Aeronautics and Space Administration, Bay St. Louis, MS. Earth Resources Lab.
G. C. Thomann.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No. NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 2099-2126, September 1975. 16 fig, 6 ref.

Descriptors: *Salinity, *Remote sensing, *Sea water, *Mississippi, *Coasts, Measurement, On-site investigations, On-site data collections, Water temperature, Evaluation, Surveys.
Identifiers: *Mississippi Sound.

The complex dielectric constant of seawarer is a function of salinity at 21 cm wavelength, and seawater salinity can be determined by a measurement of emissivity at 21 cm along with a measurement of thermodynamic temperature. Three aircraft and one helicopter experiments using two different 21 cm radiometers were conducted under different salinity and temperature conditions. Single or multiple ground truth measurements were used to calibrate the data in each experiments. RMS deviations of between 2 and 3% were found between remote and ground truth boat measurements. Part of this deviation is attributed to position mislocation between the aircraft and boats. It is inferred from these experiments that accuracies of 1 to 2% are possible with a single surface calibration point necessary only every two hours if the following conditions are met: water temperatures above 20C , salinities above 10%, and level plane flight. More frequent calibration, and two point calibration (at a high and low salinity level) rather than single point calibration may give better accuracies in some instances. (See also W78-01589) (Humphreys-ISWS)
W78-01616

AUTOMATIC INTERFACE MEASUREMENT AND ANALYSIS,
National Aeronautic and Space Administration, Bay St. Louis, MS. Earth Resources Lab.
For primary bibliographic entry see Field 7B.
W78-01617

THE MAPPING OF MARSH VEGETATION USING AIRCRAFT MULTISPECTRAL SCANNER DATA,
National Aeronautics and Space Administration, Bay St. Louis, MS. Earth Resources Lab.
For primary bibliographic entry see Field 7C.
W78-01618

THE MICROSTRUCTURE OF CALIFORNIA COASTAL FOG AND STRATUS,
San Jose State Univ., CA. Dept. of Meteorology.
For primary bibliographic entry see Field 2B.
W78-01622

ON A DIFFERENTIALLY HEATED SALT-WATER-ICE SYSTEM,
Washington Univ., Seattle. Dept. of Oceanography.
P. Welander, and J. Bauer.
Tellus, Vol. 29, No. 5, p 462-469, October 1977. 6 fig, 2 ref, 1 append. NSF OCE-13339.

Descriptors: *Ice, *Salinity, *Heat flow, *Saline water, *Temperature, Hydrodynamics, Hydraulics, Equations, Model studies, Mathematical studies.
Identifiers: Freshwater-ice oscillator, Ice-cover regime, Ice-free regime.

A previous theoretical study by Welander on a freshwater-ice oscillator was extended to the salt-water case. The system comprises a deep, high-salinity, warm water reservoir (fixed temperature and salinity) and a shallow constant-depth mixed layer with temperature, salinity, and ice thickness varying in time. This layer is cooled by contact with overlaying air kept at a fixed, subzero temperature. The main new feature is the variation of the heat flux through the water interface with stratification. This variation causes two new phenomena of interest: (1) 'false' thermal adjustments to existing ice-covered steady states, and (2) multiperiodic self-sustained oscillations including both ice-covered and ice-free regimes. The usefulness of basic model studies of this type in connection with climate research was pointed out. (Lee-ISWS)
W78-01624

QUANTITATIVE MAPPING OF SUSPENDED SOLIDS IN WASTEWATER SLUDGE PLUMES IN THE NEW YORK BIGHT APEX,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
For primary bibliographic entry see Field 5B.
W78-01627

SHORT-TERM WATER COLUMN PERTURBATIONS CAUSED BY WASTEWATER SLUDGE DUMPING IN THE NEW YORK BIGHT APEX,
State Univ. of New York at Stony Brook. Marine Sciences Research Center.
For primary bibliographic entry see Field 5B.
W78-01628

RADON 222 DISTRIBUTION AND TRANSPORT ACROSS THE SEDIMENT-WATER INTERFACE IN THE HUDSON RIVER ESTUARY,
Lamont-Doherty Geological Observatory Palisades, NY.
For primary bibliographic entry see Field 5B.
W78-01635

WINTER INTRUSIONS OF THE LOOP CURRENT,
National Oceanic Atmospheric Administration, Miami, FL. Atlantic Oceanographic and Meteorological Labs.
R. L. Molinari, S. Baig, D. W. Behringer, G. A. Maul, and R. Legeckis.
Science, Vol. 198, No. 4316, p 505-507, November 4, 1977. 2 fig, 6 ref. BLM 085 50-IA5-26.

Descriptors: *Water circulation, *Water temperature, *Gulf of Mexico, Remote sensing, On-site data collections, Circulation, Temperature, Gulfs, Currents(Water), Winter, Oceanography.
Identifiers: *Loop current(Gulf of Mexico).

The circulation in the eastern Gulf of Mexico is dominated by the so-called Loop Current, which enters the Gulf through the Yucatan Straits and exits through the Straits of Florida. The path in the interior of the Gulf varies considerably with time, sometimes following a nearly direct route between the two straits, while at other times extending far to the north, forming an anticyclonic (clockwise) loop which gives the current its name. Sea-surface temperature data obtained from satellite and subsurface temperature data obtained from ships were used to determine the intrusion of the Loop Current during the winter months. The Loop Current extended considerably farther to the north during the last three winters than has been observed previously. (Sims-ISWS)
W78-01636

A NOTE ON HORIZONTAL GRADIENTS IN FJORDS,
Oslo Univ. (Norway). Inst. of Geophysics.

F. E. Dahl.
Journal of Physical Oceanography, Vol. 7, No. 5, p 753-758, September 1977. 12 fig, 9 ref.

Descriptors: *Fjords, *On-site tests, *Water circulation, Thermocline, Water temperature, Currents(Water), Measurement, Surveys, Dissolved oxygen, Density, Salinity, Distribution, Spatial distribution, Foreign countries.
Identifiers: *Norway, *Oslofjord(Norway), Geostrophic velocity.

Observations from the Oslofjord show that the transverse gradients of temperature and density are of the same order of magnitude as those in the longitudinal direction of the fjord. A comparison between current measurements and computed geostrophic current shows good agreement which indicates that the transverse gradients in fjords should not be neglected. (Humphreys-ISWS)
W78-01638

SIMULATION MODEL OF EROSION AND DEPOSITION ON A BARCHAN DUNE,
Virginia Univ., Charlottesville.
A. D. Howard, J. B. Morton, M. Gal-el-Hak, and D. B. Pierce.
Available from the National Technical Information Service, Springfield, VA 22161 as NASA CR-2838, Price codes: A05 in paper copy, A01 in microfiche. NASA CR-2838, April 1977. 77 p, 15 fig, 3 tab, 41 ref. NGR 47-005-172.

Descriptors: *Dunes, *Wind erosion, *Wind velocity, *Saltation, *Model studies, Velocity, Sediment transport, Systems analysis, Particle size, Oceans, Equilibrium, Hydraulics.
Identifiers: *Salton Sea, *Barchan dune, Erosion patterns, Unidirectional wind.

Erosion and deposition over a barchan dune near the Salton Sea, California, was modeled. Field observations of near-surface wind velocity and direction plus supplemental measurements of the velocity distribution over a scale model of the dune were combined as input to Bagnold-type sand-transport formulas corrected for slope effects. A unidirectional wind was assumed. The resulting patterns of erosion and deposition compare closely with those observed in the field and those predicted by the assumption of equilibrium. Discrepancies between the simulated results and the observed or predicted erosional patterns appear to be due to natural fluctuations in the wind direction. The shape of barchan dunes is a function of grain size, velocity, degree of saturation of the oncoming flow, and the variability in the direction of the oncoming wind. The upwind roughness can be controlled by fixed elements or by sand in the saltation. In the latter case, dune scale is determined by grain size and wind velocity. (Singh-ISWS)
W78-01645

SURVEY OF COASTAL REVETMENT TYPES,
Coastal Engineering Research Center, Fort Belvoir, VA.
For primary bibliographic entry see Field 8B.
W78-01646

ALTERATION AND DESTRUCTION OF ESTUARIES AFFECTING FISHERY RESOURCES OF THE GULF OF MEXICO,
National Marine Fisheries Service, St. Petersburg, FL. Southeast Regional.
For primary bibliographic entry see Field 5C.
W78-01663

THE SPECIES DIVERSITY INDEX OF SOME IN-SHORE DIATOM COMMUNITIES AND ITS USE IN ASSESSING THE DEGREE OF POLLUTION ON PARTS OF THE NORTH COAST OF COMWALL,
For primary bibliographic entry see Field 5B.
W78-01678

SHORT-TERM THERMAL RESISTANCE OF ZOEAE OF 10 SPECIES OF CRABS FROM PUGET SOUND, WASHINGTON,
National Marine Fisheries Service, Seattle, WA. Northwest and Alaska Fisheries Center.
For primary bibliographic entry see Field 5C.
W78-01679

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

METHOD FOR RECLAIMING VARIEGATED WASTES,
For primary bibliographic entry see Field 5D.
W78-01203

SILICATE SCALE CONTROL IN GEOTHERMAL BRINES,
Occidental Research Corp., La Verne, CA.
E. F. Wahl, I. K. Yen, and W. J. Bartel.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-274 951, Price codes: A07 in paper copy, A01 in microfiche. Final Report G R and D 74-048, September 1, 1974. 122 p, 49 fig, 27 tab, 30 ref. OWRT 14-30-3041.

Descriptors: *Desalination, *Scaling, *Brines, Geothermal studies, Water wells, Silica, Silicates, Mathematical models, Calcite, Iron, Chemistry, Thermal water, Sea water, California.
Identifiers: *Geothermal brines, *Scaling control, East Meas Test Site(Calif).

The scaling characteristics of synthetic and East Mesa Well 6-1 geothermal brines were studied using a specially constructed test unit. The test unit was capable of simulating a variety of process conditions including flashing of the brine and separation of the vapors from the liquid prior to the scaling test section. Heated, cooled and zero heat flux probes were used. A summary of silica chemistry as related to deposition from geothermal brines is given. A mathematical model was derived and used to correlate the data for the synthetic brines experiments. The scaling rate determined from this analysis was used to show the effect of Reynolds number, bicarbonate concentration, and addition of silica sand on scaling. Experiments at the East Mesa Test Site using brine from Well 6-1 showed that the predominant scale was calcite. A mixture of iron and silica scale was the next most significant scale. No scale formed until the brine was allowed to flash. The location of scaling could be controlled by the separator operation. Relative to flashing, scaling was independent of heat flux.
W78-01316

DESALTING PLANTS INVENTORY REPORT NO. 6,
Hawaii Univ., Honolulu. Coll. of Business Administration.
N. A. El-Ramly, and C. F. Congdon.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-274 896, Price codes: A06 in paper copy, A01 in microfiche. --OWRT/S--77/6, October, 1977. 113 p, 4 tab. OWRT 14-34-0001-7526.

Descriptors: *Desalination plants, *Surveys, Census, Treatment facilities, Desalination processes, Distillation, Membrane processes, Water supply, Waste water treatment.

This is the sixth in a series of reports continuing an inventory of world-wide land-based desalting plants with capabilities of at least 25,000 (U.S.) gallons per day. It is based largely on data supplied by the world's desalting plant manufacturers. The report provides detail on plant location or operator, size, type of process, the year construction began or of plant commissioning, name of the manufacturer, type of water feed, product water use, type of fuel used, and whether or not a desalting plant operates in conjunction with an electric power generating plant (single or dual purpose). (See also W75-09852)
W78-01491

3B. Water Yield Improvement

THE NEGEV - A DESERT RECLAIMED.
United Nations Conference on Desertification, August 29-September 9, 1977, Nairobi, A/Conf. 74/16, 110 p. 14 tab, 15 ref.

Descriptors: *Deserts, *Land reclamation, *Water supply development, *Crop production, *Water utilization, Land management, Runoff, Desalination, Cloud seeding, Brackish water, Irrigation systems, Crop production, Livestock, Greenhouses, Water policy, Water transfer.
Identifiers: *Israel, *Negev, Trickle irrigation.

The climate, geomorphology, flora, and fauna of Israel's arid and semi-arid southern regions are described, and policies and technologies used in the development of the area discussed, stressing recovery in the Negev desert. Past overgrazing and overuse of vegetation for fuel and building materials denuded hillsides, exposing soil to erosion. Neglect of fragile terracing and dams furthered the desertification process. Recovery involved soil conservation measures, bringing water to the south from major water resources in the north, developing irrigation techniques, utilizing local brackish water resources, and organizing agricultural management systems adapted to desert conditions. Many agricultural settlements have been established with the aid of an incentive program including drought compensation and water subsides for irrigation. The continuing sedentarization of the Bedouin and potential industrial development of the area are also discussed. (Mills-Arizona)
W78-01184

PRELIMINARY TESTS OF A CUMULUS CLOUD SEEDING TECHNIQUE,
Atmospheric Environment Service, Downsview (Ontario).
G. A. Isaac, R. S. Schemenauer, C. L. Crozier, A. J. Chisholm, and J. I. MacPherson.
Journal of Applied Meteorology, Vol 16, No 9, p 949-958, September 1977. 9 fig, 3 tab, 20 ref.

Descriptors: *Weather modification, *Cloud seeding, *Nucleation, *Canada, Aircraft, Instrumentation, Silver iodide, Clouds, Cloud physics, Forests, Forest fires, Rainfall, Ice, Crystals, Particle size, Meteorology.
Identifiers: *Seeding tests, Ice crystals.

A cloud seeding technique was proposed which has the objective of stimulating rainfall from cumulus clouds drifting over forest fires. Preliminary tests of the ice crystal production capability of the cloud seeding technique were conducted on 5 cumulus clouds near Yellowknife, N.W.T., Canada, during July 1975. The clouds were over forest but not near forest fires. A T-33 turbulence research aircraft performed the seeding by burning wing-mounted TB1 AgI flares while flying through the clouds at the -5 to -10C level. The T-33 turbulence measurements enabled estimates to be made of the rate of dispersion of the AgI. Microphysical measurements were made before and after seeding by an instrumented DHC-6 Twin Otter aircraft flying at the seeding level, and these measurements were compared with measurements in 6 untreated cumulus clouds. High concentrations of ice crystals appeared after seeding in 4 of the 5 seeded cumulus clouds, and on 2 occasions precipitation-sized particles appeared at the seeding level. The evidence indicated that the AgI aerosol large quantities of ice crystals. (Sims-ISWS)

W78-01310

THE PROBLEM OF WEATHER MODIFICATION IN DRY FARMING IN THE SOUTHERN PART OF WESTERN SIBERIA AND NORTHERN KAZAKH SSR, (IN RUSSIAN),
Akademiya Nauk, SSSR, Novosibirsk. Inst. of Soil Sciences and Agrochemistry.
O. S. Gulyaev.
Izv Sib Otd Akad Nauk SSSR Ser Biol Nauk 2, p 3-10, 1976.

Descriptors: *Weather modification, Land reclamation.
Identifiers: *Crops, *Dry farming, Grain, *Kazakh-SSR, *Siberia, Spring, USSR, Wheat.

The use of moisture resources in grain husbandry is evaluated. Heat and water regimes of spring wheat fields are influenced by agrotechnical method and the geographical features. The need for working out the theory and practice reclamation in dry farming is indicated. A spatial evaluation is given for the possible changes in heat and moisture supply of spring crops as influenced by agronomical practice in weather modification.--Copyright 1977, Biological Abstracts, Inc.
W78-01464

WATER SUPPLY AT LOS ALAMOS DURING 1976,
Los Alamos Scientific Lab., NM.
For primary bibliographic entry see Field 4B.
W78-01547

3C. Use Of Water Of Impaired Quality

AN ANALYSIS OF A POSSIBLE CROP RESPONSE TO HAIL SUPPRESSION SEEDING: THE NELSPRUIT HAIL SUPPRESSION PROJECT,
Cansas International Corporation, Nelspruit (South Africa).
For primary bibliographic entry see Field 5D.
W78-01619

MANAGING SALINE WATER FOR IRRIGATION.
International Center for Arid and Semi-Arid Land Studies, Lubbock, TX.
Proceedings, International Salinity Conference, Texas Tech University, Lubbock, January 1977, 618 p. Dregne, H.E., ed.

Descriptors: *Salinity, *Saline water, *Irrigation water, *Water quality, Irrigation, Irrigation operation and maintenance, Irrigation effects, Irrigation efficiency, Arid lands, Semiarid climates, Deserts, Desalination, Salts, Saline doils, Irrigation practices, Brackish water, Saline water conversion, Texas, New Mexico.
Identifiers: Iraq, Pakistan.

Irrigation water salinity is becoming an increasingly serious problem as water of less and less desirable quality is exploited for irrigation and as greater intensity of water use leads to degradation. An international conference was held at Texas Tech University in Lubbock, Texas, in 1976 to assess the current state of knowledge in managing saline water for irrigation and to present new information on how to cope with salinity. Plant scientists, soil scientists, and engineers representing 20 countries participated in the sessions. Their findings are presented in this volume. Forty-seven articles are included. The tone of the papers is one of optimism that moderately saline water can be used successfully for irrigation if what is known already and what is being learned now is used effectively. Mixed with the optimism is the realization that careless management of saline irrigation water can be disastrous to the land, and more important, to the people living on that land. (See W78-01493 thru W78-01498) (Jamail-Arizona)
W78-01492

IRRIGATION WITH SALINE WATER UNDER DESERT CONDITIONS,
Higher Agricultural Council, Baghdad (Iraq).
A. Hardan.
In: Managing Saline Water for Irrigation, Proceedings of the International Salinity Conference, Texas Tech University, Lubbock, Texas, August 16-20, 1976. p 165-169, 2 tab, 6 ref.

Descriptors: *Saline water, *Irrigation effects, *Saline water systems, *Irrigation water, Salinity, Deserts, Arid lands, Groundwater, Irrigation, Wheat, Potatoes, Crop production, Fruit crops.
Identifiers: *Iraq.

The results of irrigating pear trees, wheat, and potatoes with saline water are presented. Experiments were conducted in the Western Desert of Iraq near the town of Haditha where the general climatic feature is a dry, hot summer followed by a mild winter with low precipitation. The overall objective of the desert development program is to provide for an improved way of life for the desert dwellers without abrupt changes in their life style. The results showed no significant reduction in the growth of newly planted pear trees as a result of irrigation with saline water for three years. The analysis of variance for the effect of irrigation with saline water on the yield of wheat for the three seasons showed no statistical significance. There was a significant reduction in the yield of potatoes when irrigated with water of high salinity. A typical soil profile of the area is also presented. (See also W78-01492) (Jamail-Arizona)
W78-01493

PREDICTED AND ACTUAL YIELD DECLINE FROM FIFTY PERCENT INCREASE IN SALINITY OF THE COLORADO RIVER,
California Univ., Davis. Div. of Agricultural Sciences.
F. E. Robinson.
In: Managing Saline Water for Irrigation, Proceedings, International Salinity Conference, Texas Tech University, August 1976, p 170-174, 1 tab, 1 ref.

Descriptors: *Salinity, *Colorado River, *Colorado River Basin, *Irrigation water, *Irrigation effects, *Crop production, Salt tolerance, Saline water, Irrigation, Salts, Mathematical models, Onions, Carrots, Alfalfa, Wheat, Beans, Crop response, Water quality.

A study was conducted to determine the yields of several major crops of the lower Colorado River Basin when sprinkler irrigated with different amounts of water and to compare the actual field declination to the yield declination predicted by the criteria presently utilized by the University of California Committee of Consultants. Yield predictions of onion, cabbage, carrot, alfalfa, wheat, and beans were determined from linear correlations derived from crop tolerance and leaching requirement tables of the Committee of Consultants. Six plots were irrigated with different amounts of water. The water was salinized by the addition of a saline solution to the irrigation water. The results are presented. It is concluded that in using the Committee of Consultants data to predict yield declination due to an increase in the amount of irrigation water, only the yield declinations of 10% or greater could be demonstrated significantly. Values of yield declination obtained from the Committee of Consultants gave results in an acceptable order of magnitude in waters of the Colorado River for carrots, onions, beans, alfalfa, and cabbage. (See also W78-01492) (Jamail-Arizona)
W78-01494

MODELS FOR PREDICTING THE IMPACT OF IRRIGATION ON SOIL SALINITY,
Hebrew Univ., Jerusalem (Israel). Div. of Soil Physics.
E. Bresler.
In: Managing Saline Water for Irrigation, Proceedings, International Salinity Conference, Texas Tech University, Lubbock, 1977, p 299-315, 7 fig, 13 ref.

Descriptors: *Salinity, *Saline soils, *Irrigation water, *Irrigation effects, Saline water, Water quality, Irrigation, Irrigation systems, Arid lands, Semiarid climates, Salts, Crop production, Irrigation practices, Mathematical models, Salt tolerance.
Identifiers: Drip irrigation, Trickle irrigation.

Soil salinity is an important factor of the environment in which plants grow. Salinity problems are known to exist in many soils throughout the world, particularly in arid and semiarid regions, where irrigation is necessary for successful agriculture. Prediction of salinization and sodication of irrigated soils is important in establishing management practices directed toward reclamation of saline soils already affected by improper management and maintenance or improvement of nonsaline or reclaimed irrigated soils. A summary of several original research studies on this subject is presented. A mathematical model is used to explain the relationship between soil and saline water. The problems caused by using saline water for irrigation are of both a short and long range nature. It was found that if short range effects can be predicted, it is also possible to predict long term effects. The use of trickle-drip irrigation is discussed. (See also W78-01492) (Jamail-Arizona)
W78-01495

MINIMIZING THE SALT BURDEN OF PECOS RIVER IRRIGATION DRAINAGE WATER,
New Mexico State Univ., Las Cruces. Dept. of Agronomy.
G. A. O'Connor, and C. Cull.
In: Managing Saline Water for Irrigation, Proceedings, International Salinity Conference, Texas Tech University, Lubbock, 1977, p 494-505, 2 tab, 9 fig, 5 ref.

Descriptors: *Irrigation effects, *Leaching, *Saline soils, *Salinity, *New Mexico, Salts, Irrigation, Drainage, Saline water, Agriculture, Drainage water, Lysimeters, Soil moisture, Irrigation practices, Irrigation efficiency, Soil management.
Identifiers: Minimized leaching, *Pecos River(NMex).

The success of irrigated agriculture is dependent upon the control of soil salinity. Applying as little leaching water as possible without allowing salts to accumulate in the soil to levels detrimental to the crop is known as the minimum leaching concept. Tests have shown a tremendous potential for this concept as a water and money saving device. A study was conducted to evaluate the potential using Pecos River water applied to an agricultural soil in the Pecos Valley. Overall verification of the minimized leaching concept under New Mexico conditions will consist of a laboratory study, a greenhouse study, and a field plot experiment to be conducted in the Pecos River Valley. The data reported here are for the laboratory study. Experiments were conducted on soils from the Roswell-Artesia Basin of the Pecos River Valley. The results are presented. Minimized leaching has been shown to reduce both the volume and salt load of irrigation drainage water from New Mexico soils, although several more months of irrigation are apparently needed to verify the expected results. Thus, it is suggested that minimized leaching, with its associated water savings, would offer tremendous potential to the farmers of the Pecos Valley. (See also W78-01492) (Jamail-Arizona)
W78-01496

COMPOSITION OF SALINE DRAINAGE WATER IN IRAQ AND ITS USE,
State Organization of Soils and Land Reclamation, Baghdad (Iraq).
A. B. Hanna.
In: Managing Saline Water for Irrigation, Proceedings, International Salinity Conference, Texas Tech University, Lubbock, August, 1976, p 590-597. 5 tab, 4 ref.

Descriptors: *Leaching, *Saline soils, *Saline water, *Drainage water, *Irrigation water, Drainage, Salts, Salinity, Water quality, Irrigation effects, Calcium, Ions, Electrical conductance, Alkaline soils, Alkalinity.
Identifiers: *Iraq.

A study was conducted to determine the composition of dissolved salts in main drains and collectors in Iraq, and to study seasonal fluctuations of the salt concentration and its composition, and also the possibility of using these waters for the first stages of leaching saline and saline-alkali soils. Monthly water samples were collected between January 1973 and June, 1975 from fifty sites where the most important drains and collectors were located. Leaching experiments on surface soil samples from the Abu-Ghraib area were conducted with irrigation water from the same vicinity in order to compare it with the drainage water. The results are presented and show that leaching with drain water having an electrical conductivity of 10 mmhos/cm, followed by leaching with irrigation water, was as effective as leaching with irrigation water only. It is apparent that drain water can be used in the first stage of leaching saline soils. Final leaching to reduce soil salinity can then be done with good quality irrigation water. (See also W78-01492) (Jamail-Arizona)
W78-01497

RESISTANCE TO SODA SALINIZATION OF SOME IRAQI SOILS,
Baghdad Univ. (Iraq). Dept. of Soil.
A. H. Alzubaidi.
In: Managing Saline Water for Irrigation, Proceedings, International Salinity Conference, Texas Tech University, Lubbock, August, 1976, p 333-338, 2 tab, 10 ref.

Descriptors: *Saline soils, *Irrigation water, *Soil physical properties, Arid lands, Semiarid climates, Salinity, Saline water, Sodium compounds, Irrigation, Cations, Water reuse, Soil profiles, Salt tolerance, Water quality, Land reclamation.
Identifiers: *Iraq.

The resistance of some soils in Iraq to soda salinization was investigated. It is important to have this information in managing saline water for irrigation and reclamation of different types of soils. Nine soil samples collected from various depths of different soil profiles representing different locations of Iraq were used in the study. These were tested for soil salinity. The results are presented. Due to the presence of a high quantity of soluble and exchangeable calcium and magnesium in most of the saline soils of Iraq, CO3-containing water could be used (to some limit depending on the c-value of these soils) for irrigation and during the first stages of reclamation. (See also W78-01492) (Jamail-Arizona)
W78-01498

SALINE WATERS-THEIR POTENTIALITY AS A SOURCE OF IRRIGATION,
R. P. Dhir.
In: Desertification and its Control; Indian Council of Agricultural Research, New Delhi, 1977. p 130-148, 5 fig, 14 tab, 48 ref.

Descriptors: *Salinity, *Irrigation water, *Saline water, *Water quality, Irrigation, Arid lands, Semiarid climates, Irrigation effects, Deserts, Saline soils, Irrigation practices, Brackish water, Salts, Groundwater, Soil properties, Crop production, Boron, Leaching.
Identifiers: *India(Rajasthan).

Saline waters are a common feature of the arid and semiarid regions of India, and it is often necessary to use this water for irrigation. Work done there on several aspects of the use of saline water for irrigation is discussed and the results of tests are presented. The State of Rajasthan contains large areas of arid land. It is also one of the few states in India that have been subject to thorough investigation. The problem of irrigation water salinity in Rajasthan is discussed in detail. The effect of saline water on soil properties is examined. A concluding section discusses the potential use of saline waters for irrigation. In some areas there is little choice as the saline waters may be the only water source. It was also found that the salinity resulting from the use of sodium-chloride dominated water is not permanent, but is easily leached with rainfall. (Jamail-Arizona)
W78-01506

UTILIZATION OF HIGHLY SALINE WATERS FOR WHEAT PRODUCTION: A CASE STUDY IN THE ARID ZONE OF INDIA,
Central Arid Zone Research Inst., Jodhpur (India).
R. P. Dhir.
In: Problems in the Development and Conservation of Desert and Semidesert Lands. Twenty Third International Geographical Congress, Working Group on Desertification in and Around Arid Lands, Pre-Congress Symposium, Ashkhabad, U.S.S.R., July 20-26, 1976. 1 fig, 5 ref, p 111-114.

Descriptors: *Irrigation water, *Wheat, *Crop response, *Crop production, *Salinity, Soil-water-plant relationships, Arid lands, Leaching, Rainfall, Nitrates, Nutrients, Monsoons, Sodium chloride, Irrigation, Salts, Magnesium, Crop yield, Irrigation efficiency, Adsorption.
Identifiers: *India, Kharchia.

From a study of the use of highly saline waters for growing wheat in India, it was concluded that highly saline waters can be used for irrigating wheat crops. A study of thirty-seven wheat fields was conducted in India's Pali district utilizing irrigation waters with salinity ranging from five to twenty m mho (3200-13,000 ppm). The details of site and soil characteristics, the salinity of the irrigation water, and wheat yields were recorded. Salinity values of the soils were recorded at the beginning of the irrigation season and again after six to eight irrigations. Salinity build-up was found to be dependent upon soil texture and water salinity. Salinity build-up was not permanent due to leaching during the monsoon season. Two years of normal rainfall was generally required for complete soil desalinization. An alkali hazard persisted after leaching, but did not interfere with reuse of the land for cropping wheat. It was further found that the normal mineral nutrition of a salt-resistant variety of wheat (Kharchia) was not impaired by the presence of sodium - chloride, and naturally occurring nitrates had a beneficial effect. (Ullery-Arizona)
W78-01507

SOIL SALINIZATION IN THE DELTA OF THE RIVER NILE, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Pochvennyi Inst.
V. V. Egorov, and N. G. Minashina.
Pochvovedenie 7, p 75-83, 1976.

Descriptors: *Saline soils, Salinity, Salts, *Salt tolerance.
Identifiers: Deltas, Irrigation, Rivers, *Nile River(Egypt).

Soil salinization is found mainly on the periphery of the delta. The upper and middle portions of the delta are completely under irrigation and have almost no salt affected soils. Low salt accumulation is due to the specific genesis of the delta, which occupies a lacustrine depression partly fed by running water and partitioned by a barrier from the influence of sea waters, the existence of a long lasting basin irrigation system, and the specific properties of Nile deposits which are fine and aggregated.--Copyright 1977, Biological Abstracts, Inc.
W78-01542

3D. Conservation In Domestic and Municipal Use

WATER PROBLEMS IN SOUTHWEST ASIA,
Durham Univ. (England).
For primary bibliographic entry see Field 6B.
W78-01508

WATER CONSERVATION PROBLEMS IN NORTHERN ITALY,
Bologna Environmental Agency, (Italy).
For primary bibliographic entry see Field 5D.
W78-01630

3E. Conservation In Industry

POLYMERS FOR USE IN WATER TREATMENT,
Betz Labs., Inc., Trevose, PA. (Assignee).
For primary bibliographic entry see Field 5F.
W78-01190

SYSTEM FOR SOFTENING WATER,
Goodyear Tire and Rubber Co., Akron, OH. (Assignee).
For primary bibliographic entry see Field 5F.
W78-01191

TREATMENT OF WATER CONTAINING CYANIDE,
Thiokol Corp., Newtown, PA. (Assignee).
For primary bibliographic entry see Field 5D.
W78-01194

METHOD FOR THE RECYCLE TREATMENT OF WASTE WATER FROM CHROMIUM PLATING,
Kayabakoyo-Kabushiki-Kaisha, Tokyo (Japan). (Assignee).
For primary bibliographic entry see Field 5D.
W78-01201

PETROLEUM PROCESSING WASTES, (LITERATURE REVIEW),
Metcalf and Eddy, Inc., Des Plaines, IL.
For primary bibliographic entry see Field 5D.
W78-01238

STEEL INDUSTRY WASTES, (LITERATURE REVIEW),
Water Pollution Control Directorate, Edmonton (Alberta).
For primary bibliographic entry see Field 5D.
W78-01249

BREWSTER'S NEW PHOSPHATE WASHER PLANT.
For primary bibliographic entry see Field 5D.
W78-01261

RECOVERY OF ORGANIC POLLUTANTS VIA SOLVENT EXTRACTION,
California Univ., Berkeley. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5D.
W78-01263

UTILIZATION OF PULP AND PAPER INDUSTRY WASTES (UTILIZATSIYA OTKHODOV TSELLYULOZNO-BUMAZHNOGO PROIZVODSTVA),
Tsentralnyi Nauchno-Issledovatelskii Inst. Bumagi, Moscow USSR.
For primary bibliographic entry see Field 5D.
W78-01271

EXTRACTIVES AS A RENEWABLE RESOURCE FOR INDUSTRIAL MATERIALS.
National Research Council, Washington, DC. Committee on Renewable Resources for Industrial Materials.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 357, Price codes: A13 in paper copy, A01 in microfiche. Panel report 1976. 72 p, 3 fig, 14 tab, 36 ref. NSF STP-75-01069.

Descriptors: *Resources development, *Bark, *Oil, *Lipids, *Resins, Materials, Industrial production, Vegetable crops, *Extractives, Turpentine.

An analysis of extractives as renewable industrial materials was performed to identify their optimum use, and means of overcoming barriers to their use. Extractives studied were bark, naval stores, vegetable oils, tallow and fats, and oils from aquatic sources. Information on current use and flow of industrial materials of these extractives and estimates of their production and use in 1985 and 2000 shows that total amounts may increase to 5 times present levels, with major increases indicated in naval stores and tallow markets if demands and economic incentives are adequate. The analysis relates the availability and cost of extractives to the supply situation of respective main products and to availability and cost of competing nonrenewable materials, predicting that the supply situation will be stable for the next 25 years. A review of current and potential technology and applications that would extend the use of extractives indicates a necessity to increase their production and availability and to demonstrate their potential in industrial applications. Increased production of unsaturated fatty acids, increased availability and utilization of oleoresin chemicals, and demonstration of the potential of bark as a chemical raw material in a pilot plant are recommended. (Wares-IPA)
W78-01549

NEW ASPECTS OF CLOSED PROCESSING CIRCUITS IN THE PAPER AND PAPERBOARD INDUSTRY,
Sulzer Bros. Ltd., Winterthur (Switzerland).
For primary bibliographic entry see Field 5D.
W78-01565

STEAM ENERGY UTILIZATION,
Bowater Technical Services Ltd., Northfleet (England).
A. B. Webzell.
Paper Technology and Industry, Vol 17, No 4, p 161-166, August, 1976. 2 appendices, 2 fig, 4 ref.

Descriptors: *Pulp and paper industry, *Heat balance, *Steam, Energy, Thermal properties, Water, Liquids, Water vapor, Water types, Heat exchangers, Boiler feed water, Piping systems(Mechanical).
Identifiers: Paper machine, *Heat recovery, Condensates.

A brief discussion of the potential and kinetic energies of water in the solid, liquid, and vapor states is presented. A schematic diagram of heat balance in a paper machine is included to indicate the importance of a heat recovery system. Over 26,900 of the 30,000 kw/hr of heat energy supplied to the paper machine are normally lost as moisture-laden air exhausted to the atmosphere. Air-to-water heat exchangers, and heat pipes are discussed. A steam and condensate system allowing up to 30% blow-through steam is presented as an effective means of heat transfer from the drying cylinder to the paper web. Mill experiences are presented where an increased power demand was not accompanied by an increase in process demand for steam, and where feed water to the boilers was limited by a low level of condensate returns, and solutions are provided. (Swichtenberg-IPC)
W78-01567

WATER CONSERVATION PROBLEMS IN NORTHERN ITALY,
Bologna Environmental Agency, (Italy).
For primary bibliographic entry see Field 5D.
W78-01630

PAPER AND ALLIED PRODUCT, (LITERATURE REVIEW),
National Council of the Paper Industry for Air and Stream Improvement Inc., New York.
For primary bibliographic entry see Field 5D.
W78-01660

3F. Conservation In Agriculture

THE NEGEV - A DESERT RECLAIMED.
For primary bibliographic entry see Field 3B.
W78-01184

CENTER PIVOT IRRIGATION SYSTEM,
Lindsay Manufacturing Co., NB. (Assignee).
C. H. Meis, D. A. Siekmeier, and A. L. Zimmerer.
U.S. Patent No. 4,011,990, 9 p, 8 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 956, No 3, p 852, March 15, 1977.

Descriptors: *Patents, *Irrigation, *Sprinkler irrigation, *Distribution systems, *Irrigation efficiency, Irrigation practices, Application equipment.

A center pivot irrigation system is specifically constructed to water the corners of a square field. The system has an extension for a center pivot irrigation system which may either trail or lead the main pipeline. The main pipeline is stationary and inoperative while the extension is pivoting and watering a corner and when the main pipeline is moving and irrigating, the extension is folded in and is inoperative. The extension has indexable wheels, which are in a trailing position when the main pipeline is stationary and are indexed 90 degrees and rotated through th. corner when the main pipeline is stationary opposite a corner. (Sinha - OEIS)
W78-01204

IRRIGATION METHOD AND APPARATUS,
D. M. Williams.
U.S. Patent No. 4,010,898, 7 p, 6 fig, 16 ref; Official Gazette of the United States Patent Office, Vol 956, No 2, p 487, March 8, 1977.

Descriptors: *Patents, *Irrigation, *Sprinkler irrigation, *Irrigation efficiency, Water distribution(Applied), Application equipment, Irrigation practices.

The method is carried out by application of water to cover an outward directed area away from each tree trunk of plant covering a consistent area during each application. The apparatus includes a semi-permanent, semi-looped elastic distributing conduit having a closed end and an open end with spray nozzles in the upper surface for distributing liquid outward from the plant in fan-like overlapping patterns. The apparatus becomes a semi-permanent installation. The object is to provide an irrigation method and apparatus utilizing the high-frequency pressure application that is effective to prevent the accumulation of dangerous levels of salt above the root zone of plants and to prevent wetting of the plant. (Sinha-OEIS)
W78-01213

UNDERGROUND IRRIGATION DEVICES AND METHODS OF MAKING AND USING THE SAME,
W. M. Angle.
U.S. Patent No. 4,010,298, 5 p, 7 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 956, No 1, p 262, March 1, 1977.

Descriptors: *Patents, *Irrigation, *Subsurface irrigation, Distribution systems, Irrigation efficiency, Irrigation practices, Application equipment.

The invention consists primarily of a main reservoir or source of fluid and primary distribution lines coupled to the source and intended to carry fluid to secondary distribution lines. Each of the secondary distribution lines is provided with anti-clog apertures to allow flow of fluid to the soil. The primary and secondary lines are placed below the surface of the ground. A device is provided which will also act as a drainage device; fertilizers and other materials may be fed into the soil by it. A perforated pipe suitable for subsurface irrigation laterals is formed with indentations and perforations in sheet material that is then rolled into a tube or pipe. (Sinha-OEIS)
W78-01214

HYDRANT CONSTRUCTION FOR A SOIL IRRIGATION SYSTEM,
Academy of Agricultural Sciences, Sofia (Bulgaria). Central Lab. for Agro-physical Investigations.
I. S. Varlev.
U.S. Patent No. 4,009,830, 4 p, 3 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 956, No 1, p 127, March 1, 1977.

Descriptors: *Patents, *Irrigation, *Irrigation systems, *Irrigation efficiency, Irrigation practices, Application equipment, Water delivery.
Identifiers: Submerged hydrants.

A submersible hydrant for soil irrigation systems is adapted to receive a movable cap member which cooperates with the hydrant housing for selective blocking during submergence of the hydrant. An aperture in the side wall of the hydrant housing distributes the irrigation fluid. The cap member and the surrounding housing are suitably threaded to permit adjustable positioning of the cap in the upper housing portion at a desired position between upper and lower limits at which the distribution aperture is completely open and closed, respectively. The capturing means may include a limit pin which projects inward from the side wall of the upper housing above the distributing aperture which serves to inhibit further upward movement of the cap after the distributing aperture is completely exposed. In order to provide an effective fluid-tight, contamination-proof seal between the cap and the interior of the hydrant housing when the hydrant is in its submerged position, the housing is provided with an inwardly tapering shoulder that cooperates with a seal of complementary shape carried on the lower end of the cap. The cap may be provided with a bore extending longitudinally and terminating at its upper end in a nozzle to propel a jet-type spray upward from the hydrant thereby wetting and softening the surrounding soil. This facilitates the upward movement of the hydrant out of the ground. (Sinha-OEIS)
W78-01215

IRRIGATION MEANS FOR THE UNIFORM DISTRIBUTION OF LIQUID,
U. Tiedt.
U.S. Patent No. 4,009,832, 7 p, 19 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 956, No 1, p 128, March 1, 1977.

Descriptors: *Patents, *Irrigation, *Subsurface irrigation, *Irrigation efficiency, Irrigation practices, Flow control, Water delivery, Application equipment.

The object is to improve known irrigation systems so that a substantially uniform distribution of liquid is achieved without the need for separate valves in the outlet apertures and with a tube wall thickness governed only by the internal liquid pressure to be withstood. Any impurities in the region of the outlet apertures can be flushed out by a self-cleaning effect which is controlled by the liquid pressure. The irrigation tube is provided with an internal flap underlying the outlet apertures and by means of which the outflow resistance offered to the liquid is variable in response to the liquid pressure in the tube. At least one longitudinal portion of the flap lies against the inner surface of the tube wall under liquid pressure and the contacting faces of the tube and flap throttle the flow of liquid by reasons of the surface structure. (Sinha-OEIS)
W78-01216

GENERAL IRRIGATION PROJECT REGULATIONS (OPERATION AND MAINTENANCE).
Bureau of Indian Affairs, Washington, DC.
For primary bibliographic entry see Field 6E.
W78-01362

THE PROBLEM OF WEATHER MODIFICATION IN DRY FARMING IN THE SOUTHERN PART OF WESTERN SIBERIA AND NORTHERN KAZAKH SSR, (IN RUSSIAN),
Akademiya Nauk, SSSR, Novosibirsk. Inst. of Soil Sciences and Agrochemistry.
For primary bibliographic entry see Field 3B.
W78-01464

PHYSICAL PROPERTIES AND MOISTURE CONDITIONS IN CLAYEY GLEY SOILS OF THE KOLKHIDA LOWLAND, (IN RUSSIAN),
All Union Research Inst. of Tea and Subtropical Plants.
N. I. Gudzhabidze, and I. A. Motsereliya.
Pochvovedenie 7, p 110-114, 1976.

Descriptors: *Soil physical properties, *Soil moisture, *Clays, Corn(Field), Humidity, Soil profiles, Agriculture.
Identifiers: Drainage, Gley, *Kolkhida, Lowlands(Georgian SSR), Soils, USSR.

Soils in the Kolkhida Lowland (Georgian SSR, USSR) are drained by means of a system of canals supplemented by agricultural improvement measures such as profile strips, surface planning according to natural slopes and frequent ridges. A study of the effects of these measures on the moisture conditions and physical properties of swelling soils planted with corn indicated that the mechanism operates in practically water impermeable subsoil at a depth not more than 30-40 cm from the surface. On drained fields a relatively high air content was noted only in the cultivated soil layers. Mechanical loosening of the soil does not allow an increase in air content because soil fragments tend toward maximum dense packing after moistening. Significant reduction of moisture and the optimal water-air soil condition can only be achei·ed by dehumidification as much as possible while simulataneously improving its physical properties toward increased aeration of the soil mass. --Copyright 1977, Biological Abstracts, Inc.
W78-01472

MANAGING SALINE WATER FOR IRRIGATION.
International Center for Arid and Semi-Arid Land Studies, Lubbock, TX.
For primary bibliographic entry see Field 3C.
W78-01492

MINIMIZING THE SALT BURDEN OF PECOS RIVER IRRIGATION DRAINAGE WATER,
New Mexico State Univ., Las Cruces. Dept. of Agronomy.
For primary bibliographic entry see Field 3C.
W78-01496

THE RAJASTHAN CANAL PROJECT,
A. S. Kapoor, and B. S. Rajvanshi.
In: Desertification and its Control: Indian Council of Agricultural Research, New Delhi, 1977. p 121-129, 2 tab.

Descriptors: *Canals, *Canal design, *Canal construction, *Irrigation canals, Water resources, Water resources development, Water supply, Arid lands, Deserts, Irrigation, Irrigation water, Social aspects.
Identifiers: India, Rajasthan.

A canal is being constructed in the Thar Desert in the northwestern part of the Rajasthan, India, and efforts are being made to colonize the area. The Thar is described and the hazards, methods of execution, and the progress achieved on the canal project are discussed. With irrigation waters from the canal it is hoped that the now barren lands will be converted into extensive agricultural lands. The actual construction of the canal, which is divided into two stages, is discussed in detail. The amount of land to be irrigated and the costs of the project are given. The problems in the construction of the project are described. Conclusions are presented and are basically concerned with the benefits to the region when the project is completed. (Jamail-Arizona)
W78-01505

AN ANALYSIS OF A POSSIBLE CROP RESPONSE TO HAIL SUPPRESSION SEEDING: THE NELSPRUIT HAIL SUPPRESSION PROJECT,
Cansas International Corporation, Nelspruit (South Africa).
For primary bibliographic entry see Field 3B.
W78-01619

EFFECTIVE RAINFALL IN IRRIGATED AGRICULTURE,
Indian Agricultural Research Inst., New Delhi.
For primary bibliographic entry see Field 2B.
W78-01642

EFFECTIVENESS OF AGRICULTURAL IMPROVEMENTS FOR THE CULTIVATION OF TEA SHRUBS IN THE KOLKHIDA LOWLAND, (IN RUSSIAN),
R. I. Papisov.
Pochvovedenie 7, p 84-93, 1976.

Descriptors: *Cultivation, *Crop response, *Soil properties, *Drainage effects, *Drainage practices, Subsurface drainage, Soil moisture, Water table, Runoff, Kolkhida, *Tea shrubs, U.S.S.R.

Changes in soil properties and processes due to improvements of water regime (drainage) were studied. Observations on the soil moisture regime and the fluctuations of the ground water table, the estimation of inner and surface runoff, the determination of physical, chemical and biological soil properties, as well as the tea shrub development and yields indicate the necessity of applying profiling ridges in combination with subsurface drainage, placed at 10 m intervals, on soils of Kolkhida, USSR, lowland.--Copyright 1977, Biological Abstracts, Inc.
W78-01689

SOIL WATER SYSTEM AND YIELD OF FIELD CROPS WITH DIFFERENT TILLAGE SYSTEMS, (IN RUSSIAN),
Moskovskaya Sel'skokhozyaistvennaya Akademiya (USSR). Div. of Agriculture Experiment Methods.
B. A. Dospekhov, A. Ya. Rassadin, and A. E. Alekseeva.
Izv Timiryazev S-Kh Akad 4, p 54-62, 1976.

Descriptors: *Soil moisture, *Moisture content, *Soil treatment, *Cultivation, *Crop response, On-site investigations, Soil types, Loam, Podzols, Alkaline soils, Mechanical control, Field crops, Evaporation, Water requirements, U.S.S.R.

In complex field experiments conducted on medium loamy, weakly-cultivated, soddy-weakly-podzolized soil, the effects of providing field crops with moisture under different systems of soil tillage were investigated. Making the depth smaller and decreasing the number of mechanical cultivations from 4-5 to 1 using rotary type implements did not produce a negative effect upon plants with moisture or themoisture content in the 1 m soil layer when the moisture content was equal to field water capacity. Under such conditions the total amount of water for desuction and evaporation from the 1 m soil layer under potatoes and barley was higher by 9.7 and 12.5%, respectively, then under conventional tillage conditions. Under conditions of insufficient soil moisture in the treatments with milling tillage and combination of 3-stage and deep presowing milling tillage, water needed per ton of crop was 16 and 10% lower in growing barley and 25 and 22% in growing vetch-oats mixture (hay).--Copyright 1977 Biological Abstracts, Inc.
W78-01691

AUTOMATIC ANTI-SIPHON VALVE,
C. C. Rodieck.
U.S. Patent No 4,014,361, 6 p, 5 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 956, No 5, p 1661, March 29, 1977.

Descriptors: *Patents, *Irrigation, *Irrigation efficiency, Application equipment, Flow control, *Valves.

Irrigation systems in general tend to place large amounts of water in areas where they are not needed and may not provide enough water to other plants which are located near the top of a hill. This is caused by a siphoning effect which draws water from higher positions when the water is turned off. This invention directs itself toward the solution of this siphoning problem. A hollow valve body with a cylindrical side has a first outlet through its top end. An inlet is formed through the side of the valve body for receiving water under pressure. A second outlet is provided near the bottom of the valve body. A cylindrical valve gate is positioned concentric within the hollow of the cylindrical valve body. A valve seat is attached at the top end and is adapted for receiving the top end of the valve gate so as to block water flow through the first outlet. A float is connected to the top end of the valve gate by a rod. The float is capable of urging the valve gate against the valve seat whenever the water level outside of the valve body is above or at a pre-selected level. (Sinha-OEIS)
W78-01694

FLUID-FLOW CONTROL DEVICES PARTICULARLY USEFUL AS DRIPPER NOZZLES IN TRICKLE IRRIGATION,
P. Rosenberg.
U.S. Patent No 4,014,473, 5 p, 6 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 956, No 5, p 1698, March 29, 1977.

Descriptors: *Patents, *Irrigation, *Flow control, Irrigation efficiency, Irrigation practices, Application equipment.
Identifiers: *Drip irrigation.

A fluid-flow control device particularly useful as a dripper nozzle in trickle irrigation comprises a conduit having an enlarged convex head attached to a cap defining a housing within which is enclosed a double-concave regulating member. The convex head has an axial passageway engageable by one face of the concave member. The inner face of the cap has a depending boss engaging the other face of the concave member. The arrangement being such that during the flow of fluid through the passageway, the regulating member is set into rapid oscillating movement to rapidly open and close its outlet and thereby to control the flow of the fluid. (Sinha-OEIS)
W78-01697

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

THE NEGEV - A DESERT RECLAIMED.
For primary bibliographic entry see Field 3E.
W78-01184

A LEAST SQUARES METHOD FOR COMPUTING STATISTICAL TOLERANCE LIMITS,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 7C.
W78-01307

WATER RESOURCES DATA FOR MISSISSIPPI, WATER YEAR 1976.
Geological Survey, Jackson, MS. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01317

WATER RESOURCES DATA FOR MICHIGAN, WATER YEAR 1975.
Geological Survey, Okemos, MI. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01318

WATER RESOURCES DATA FOR CONNECTICUT, WATER YEAR 1976.
Geological Survey, Hartford, CT. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01319

WATER RESOURCES DATA FOR ARIZONA, WATER YEAR 1975.
Geological Survey, Tucson, AZ. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01320

WATER RESOURCES DATA FOR WISCONSIN, WATER YEAR 1975.
Geological Survey, Madison, WI. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01321

WATER RESOURCES DATA FOR HAWAII AND OTHER PACIFIC AREAS, WATER YEAR 1975.
Geological Survey, Honolulu, HI. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01322

WATER RESOURCES DATA FOR INDIANA, WATER YEAR 1976.
Geological Survey, Indianapolis, IN. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01323

WATER RESOURCES DATA FOR IDAHO, WATER YEAR 1975.
Geological Survey, Boise, ID. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01324

WATER RESOURCES DATA FOR IOWA, WATER YEAR 1976.
Geological Survey, Iowa City, IA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01326

WATER RESOURCES DATA FOR OHIO, WATER YEAR 1976--VOLUME 1. OHIO RIVER BASIN.
Geological Survey, Columbus, OH. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01328

WATER RESOURCES DATA FOR OHIO, WATER YEAR 1976--VOLUME 2. ST. LAWRENCE RIVER BASIN.
Geological Survey, Columbus, OH. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01329

WATER RESOURCES DATA FOR PENNSYLVANIA, WATER YEAR 1976--VOLUME 1. DELAWARE RIVER BASIN.
Geological Survey, Harrisburg, PA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01330

WATER RESOURCES DATA FOR PENNSYLVANIA, WATER YEAR 1976--VOLUME 2. SUSQUEHANNA AND POTOMAC RIVER BASINS.
Geological Survey, Harrisburg, PA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01331

WATER RESOURCES DATA FOR PENNSYLVANIA, WATER YEAR 1976--VOLUME 3. OHIO RIVER AND ST. LAWRENCE RIVER BASINS.
Geological Survey, Harrisburg, PA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01332

WATER RESOURCES DATA FOR TEXAS, WATER YEAR 1976--VOLUME 1. ARKANSAS RIVER BASIN, RED RIVER BASIN, SABINE RIVER BASIN, NECHES RIVER BASIN, TRINITY RIVER BASIN AND INTERVENING COASTAL BASINS.
Geological Survey, Austin, TX. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01333

WATER RESOURCES DATA FOR TEXAS, WATER YEAR 1976--VOLUME 2. SAN JACINTO RIVER BASIN, BRAZOS RIVER BASIN, SAN BERNARD RIVER BASIN AND INTERVENING COASTAL BASINS.
Geological Survey, Austin, TX. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01334

WATER RESOURCES DATA FOR TEXAS, WATER YEAR 1976--VOLUME 3. COLORADO RIVER BASIN, LAVACA RIVER BASIN, GUADALUPE RIVER BASIN, NUECES RIVER BASIN, RIO GRANDE BASIN AND INTERVENING COASTAL BASINS.
Geological Survey, Austin, TX. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01335

WATER RESOURCES DATA FOR ALASKA, WATER YEAR 1975.
Geological Survey, Anchorage, AL. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01336

WATER RESOURCES DATA FOR NEW MEXICO, WATER YEAR 1975.
Geological Survey, Albuquerque, NM. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01338

WATER RESOURCES DATA FOR SOUTH DAKOTA, WATER YEAR 1976.
Geological Survey, Huron, SD. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01339

WATER RESOURCES DATA FOR NEW HAMPSHIRE AND VERMONT, WATER YEAR 1975.
Geological Survey, Boston, Mass. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01340

WATER RESOURCES DATA FOR MASSACHUSETTS AND RHODE ISLAND, WATER YEAR 1975.
Geological Survey, Boston, Mass. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01341

DESIGNATION OF NEW RIVER SEGMENT AS A COMPONENT OF THE WILD AND SCENIC RIVERS SYSTEM.
For primary bibliographic entry see Field 6E.
W78-01365

THE INFLUENCE OF FORESTS ON THE WATER REGIME OF SMALL RIVERS IN THE BELORUSSIAN POLESYE, (IN RUSSIAN),
Akademiya Navuk BSSR, Minsk. Inst. of Experimental Botany.
I. D. Yurkevich, N. F. Lovchii, and E. P. Yaroshevich.
Lesovedenie 5, p 3-11, 1976.

Descriptors: *Floods, *Belorussian Polesye(USSR), Flooding, *Forests, Rivers, *Seasonal, Spring.

Investigations of small river regimes in the Belorussian Polesye (USSR) are discussed with relation to afforestation of their basins. With increased afforestation the total annual outflow of rivers changes little, but the duration of spring floods increases and their intensity decreases; summer floods become more even. Duration of the floods increases, on an average, by 4 days/10% of afforestation, and the greatest average daily modulus of flow decreases by 10 l/s from 1 km2;

the greatest summer flood average daily modulus of the outflow is 1.8 l/s smaller.--Copyright 1977, Biological Abstracts, Inc.
W78-01453

INTRODUCTION TO THE SANDUSKY RIVER BASIN,
Heidelberg Coll., Tiffin, OH.
For primary bibliographic entry see Field 5B.
W78-01519

THE GEOLOGIC SETTING OF THE SANDUSKY RIVER BASIN,
Bowling Green State Univ., OH. Dept. of Geology.
J. L. Forsyth.
In: Proceedings of Sandusky River Basin Symposium, Held at Tiffin, Ohio on May 2-3, 1975. p. 13-60. 3 fig, 67 ref.

Descriptors: *Geology, *Geologic history, *Glaciers, *River basins, Till, Stratigraphy, Glacial drift, Rivers, Watersheds(Basins), Lake Erie, Ohio.
Identifiers: *Sandusky River Basin(Ohio).

The underlying bedrock of the Sandusky River Basin in Ohio is mostly Silurian-Devonian carbonates (limestone and dolostone), with Devonian shale and Mississippian sandstone further southeast. The relatively nonresistant limestone and dolostone produced the characteristic plains of western Ohio, while the younger, resistant sandstone formed the hills of the state's eastern part. The area lies just east of the crest of the Cincinnati Arch. The mantle, which averages 40 ft in thickness, is composed mostly of glacial till, often covered by thin glacial lake deposits or alluvium. Presently-active geologic processes are flooding and erosion of rivers in the basin, flow of alkaline spring water into the rivers, and flooding and erosion of Lake Erie. Modern Sandusky Basin geologic history begins with the retreat of the last (Wisconsin) glacier from northern Ohio. When the ice margin retreated from the Wabash or Fort Wayne End Moraines, and small shallow lakes or marshes developed, normal drainage of the land began, the start of the Sandusky River system. When the retreating ice finally exposed an eastern outlet lower than any to the west, a greatflood ensued. When it subsided, only two tiny ponds remained in the bottom of the Erie Basin. As the Niagara Falls area slowly rose, the level of Lake Erie also rose. Revegetation of the Sandusky Basin occurred with deglaciation, followed by the reappearance of animals, and shortly after, by early man. (See also W78-01518) (Lynch-Wisconsin)
W78-01520

EFFECTS OF ADVANCED WASTE TREATMENT AND FLOW AUGMENTATION ON WATER QUALITY DURING LOW STREAM FLOWS,
Heidelberg Coll., Tiffin, OH. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W78-01522

IMPACT OF REMOTE SENSING UPON THE PLANNING, MANAGEMENT AND DEVELOPMENT OF WATER RESOURCES,
Ecosystems International, Inc., Gambrills, MD.
For primary bibliographic entry see Field 7B.
W78-01541

PROCEEDINGS OF THE NASA EARTH RESOURCES SURVEY SYMPOSIUM, JUNE 1975, TECHNICAL SESSION PRESENTATIONS, LAND USE-MARINE RESOURCES, VOLUME I-C.
National Aeronautics and Space Administration, Houston, TX. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7B.
W78-01589

AN EXAMINATION OF THE POTENTIAL APPLICATIONS OF AUTOMATIC CLASSIFICATION TECHNIQUES TO GEORGIA MANAGEMENT PROBLEMS,
Georgia Dept. of Natural Resources, Atlanta. Office of Planning and Research.
B. Q. Rado.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 1525-1540, September 1975. 3 fig, 9 ref.

Descriptors: *Remote sensing, *Georgia, *Land classification, Land resources, Land use, Coastal marshes, Agriculture, Census, Planning, Management.
Identifiers: LANDSAT, Technology transfer, Land use allocation model.

State and federal legislation, along with improved methods and techniques for data acquisition and manipulation, has created new opportunities for state, regional, and local planning. One such opportunity included representatives from the State of Georgia and other southeastern states who participated in a workshop at the NASA/Earth Resources Laboratory in Bay St. Louis, Mississippi. The purpose of the workshop was to become more familiar with automatic classification techniques as they may relate to future statewide planning systems. Applications of automatic classification techniques to Georgia management problems were discussed. Presented were some of the issues which need to be addressed in a statewide system, and suggestions for how automatic classification techniques can be made compatible with such a system. The observations regarding the implementation of an automatic classification system in Georgia were based upon preliminary investigations with NASA and potential users throughout the State. (See also W78-01589) (Humphreys-ISWS)
W78-01590

OHIO'S STATEWIDE LAND USE INVENTORY: AN OPERATIONAL APPROACH FOR APPLYING LANDSAT DATA TO STATE, REGIONAL AND LOCAL PLANNING PROGRAMS,
Ohio Dept. of Economic and Community Development, Columbus. Div. of Community Services.
P. E. Baldridge, P. H. Goesling, F. Leone, C. Minchall, and R. H. Rodgers.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 1541-1552, September 1975. 8 ref.

Descriptors: *Ohio, *Land use, *Remote sensing, *Census, Remote sensing, Analytical techniques, Cities, Computers, Coasts, Rural areas, Wetlands, Agriculture, Forests, Planning, Land classification, Mapping, Surface waters, Mining, Ranges, Suburban areas.
Identifiers: LANDSAT.

The paper provided a brief description of the programmatic, technical, user application, and cost factors associated with the development of an operational, statewide land use inventory from LANDSAT data. The Ohio land use inventory is a beginning step. As it is completed, it will undergo accuracy and verification tests. Test sites will be randomly selected from the inventory and then compared with available ground truth information. Further, the inventory will undergo continuous and varied user evaluation as it is applied to state, regional, and local planning programs. The combination of random accuracy tests and user assessments will be used as input into inventory update projects. LANDSAT MSS data are subjected to geometrical and categorical processing to produce map files for each of the 200 fifteen minute quads covering Ohio. LANDSAT computer compatible tapes will be rescanned to produce inventory tapes which identify 8 Level I land use categories and a variety of Level II categories. The inventory tapes will then be processed through a series of 10 software programs developed by the State of Ohio. The net result will be a computerized inventory which can be displayed in map or tabular form for various geographic units at a variety of scales and for selected categories of usage. The computerized inventory data files will be applied to technical programs developed by the various state agencies. The entire project will be completed at a lower cost than previous statewide inventories. (See also W78-01589) (Humphreys-ISWS)
W78-01591

THE DESIGN, IMPLEMENTATION, AND USE OF A STATEWIDE LAND USE INVENTORY: THE NEW YORK EXPERIENCE,
Cornell Univ., Ithaca, NY.
E. E. Hardy.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 1573-1601, September 1975. 24 fig.

Descriptors: *New York, *Land use, *Census, Analytical techniques, Remote sensing, Land classification, Water, Land, Public lands, Forests, Agriculture, Natural resources, Costs, Mapping.
Identifiers: *LANDSAT, Skylab.

The total cost of the New York State inventory, which was done from 1968-70, was $10 per square mile for 135 items, computerized and geographically recognized. To get satellite information into the system through a manual output, costs about 4 cents per square kilometer for level I category from a 671 image. In terms of design concepts, the following 11 steps were found to be very important: (1) The overall design of the project in relation to its uses, (2) The classification based on the needs and resources of value, (3) Data acquisition, (4) Geographic referencing, (5) Data processing, (6) Data storage, (7) Data retrieval, (8) Application, (9) Warehousing of raw data, (10) Development of a user service, and (11) Documentation of the entire operation. The last step includes the computer program, the techniques for doing the work, and, above all, a photographic atlas of the land uses that have been recorded at that time. Without this atlas, we do not really have a resource inventory. If we fail to take time to create this atlas concept, it is impossible to do the work over again. Ninety percent of the thousands of applications and requests are for map overlays, whereas only 10% are for the computer products. Most of us may be overlooking many of the good products that some labor-intensive opportunities still offer for dealing with the large volume of resource information. Another point that many of us overlook is that not every land-use information system is automatically transferable to other parts of the country or to other parts of the world. (See also W78-01589) (Humphreys-ISWS)
W78-01592

ALASKAN RESOURCES, CURRENT DEVELOPMENT, TRADITIONAL CULTURAL VALUES, AND THE ROLE OF LANDSAT DATA IN CURRENT AND FUTURE LAND USE MANAGEMENT PLANNING,
Alaska Univ., College.
A. LaPerriere.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No. NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 1603-1608, September 1975. 2 ref.

Descriptors: *Alaska, *Land use, *Wildlife habitats, Remote sensing, Wildlife, Resources, Land management, Census, Planning, Mapping, Vegetation, Environment, Analytical techniques.

Identifiers: LANDSAT.

Past, present, and proposed applications of LANDSAT data for renewable resource assessments in Alaska were described. Five specific projects were discussed briefly. The projects include a feasibility investigation applying LANDSAT data to caribou habitat mapping in northeast Alaska, analysis of a native corporate region in southwest Alaska, analysis of a game management unit in interior Alaska, and two proposed analyses in northwest Alaska. The analyses principally address range evaluations concerning caribou, moose, and Dall sheep, but results have application to other renewable resource themes. Renewable resources are the traditional basis for land-use and value in Alaska, but dramatic land status changes are currently occurring. The changes, along with the national demands for non-renewable resources, are resulting in rapidly accelerated development. Statewide synoptic resource assessment using LANDSAT data is tenable and, in fact, occurring, although not as an organized effort directed to that objective. However, LANDSAT analyses for the entire State probably will be available by 1980. The results can be utilized in development of a statewide land-use management plan. (See also W78-01589) (Humphreys-ISWS)
W78-01593

CASES IN THE RELATION OF RESEARCH ON REMOTE SENSING TO THE DECISION-MAKERS IN A STATE AGENCY,
Wisconsin Univ.-Madison. Inst. for Environmental Studies.
J. W. Jondrow.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No. NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 1617-1630, September 1975. 4 fig, 5 ref.

Descriptors: *Decision making, *Management, *Remote sensing, Research and development, Water quality, Land use, Attitudes, Planning, Methodology, Technology, Analytical techniques, Inter-agency cooperation, Communication, Institutions, Information exchange.
Identifiers: *Technology transfer, LANDSAT.

Research on the application of remote sensing can be used effectively in solving problems of water quality and land use if researchers and the state agency personnel responsible for water quality and land use work together to assure that research projects and agency needs are aligned closely. However, developing goals and projects that fit the requirements of research units as well as the state agencies is aided by the use of several management tools. This paper described the characteristics of several processes that transfer research results to government agencies. Also, the management of three projects and the Data Center was delineated to illustrate the application of the mentioned management tools in the effort to guarantee the applicability of university research to agency needs. To include in a research project the dimension of relevance to decisionmaking, objectives and specific tasks should be designed to call attention to the need for communication as part of the process of research. Aids should be available to supplement the communication skills of researchers and decisionmakers. This schedules should allow participants in the research to withhold their judgements of what is being communicated, or whether communication is successful, long enough for the dialogue necessary at crucial points to mature. Participants in the research and decisionmaking aspects of an enterprise must be helped to expect success in finding the relationships between research and use wherever there are possibilities for such a connection. (See also W78-01589) (Humphreys-ISWS)
W78-01594

THE DEVELOPMENT OF A LAND USE INVENTORY FOR REGIONAL PLANNING USING SATELLITE IMAGERY,
Ohio-Kentucky-Indiana Regional Council of Governments, Cincinnati, OH.
A. H. Hessling, and T. G. Mara.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No. NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 1631-1636, September 1975. 4 fig, 6 ref.

Descriptors: *Land use, *Mapping, *Ohio, *Kentucky, *Indiana, Remote sensing, Planning, Regional analysis, Land classification, Data processing, Forests, Agriculture, Analytical techniques, Census, Land, Water, Natural resources.
Identifiers: LANDSAT.

Under provisions of Section 208 of the Federal Water Pollution Control Act Amendments of 1972, the Ohio-Kentucky-Indiana Regional Council of Governments (OKI) received a grant for water quality planning for a nine county area centered around Cincinnati, Ohio. Because water quality is in large part determined by land-use activities and patterns, detailed up-to-date land-use data is needed. Traditional land-use inventory techniques are too time consuming. Land-use data generated by computer processing of satellite imagery offer a viable alternative for obtaining the needed information. OKI's experience in the development of a land-use inventory was successful. The total acreage for each drainage area as measured from the satellite data matched very closely the acreage measured by using a planimeter. Field checks and interviews with farmers and agricultural agents have shown that the categorization has been accurate within a reasonable level of tolerance. The extent to which satellite imagery and related services will be used for regional planning in the future may depend upon improved communications and the establishment of a closer working relationship between the users and the researchers. (See also W78-01589) (Humphreys-ISWS)
W78-01595

LUMIS-A LAND USE MANAGEMENT INFORMATION SYSTEM FOR URBAN PLANNING,
Caltech Jet Propulsion Lab., Pasadena, CA.
C. K. Paul.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No. NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 1637-1664, September 1975. 11 fig, 1 tab, 9 ref.

Descriptors: *Land use, *City planning, *California, *Management, Photogrammetry, Terrain analysis, Surveys, Data processing, Census, Planning, Natural resources, Mapping, Information retrieval, Computer programs, Aerial photography, Analytical techniques.
Identifiers: *Los Angeles(Calif), *Santa Monica Mountains, Land use management information system(LUMIS), Polygon intersection overlay system(PIOS).

The Land Use Management Information System (LUMIS) consists of a methodology of compiling land use maps by means of air photo interpretation techniques, digitizing these and other maps into machine-readable form, and numerically overlaying these various maps in two computer software routines to provide land use and natural resource data files referenced to the individual census block. The two computer routines are the Polygon Intersection Overlay System (PIOS) and an interactive graphics APL program. A block referenced file of land use, natural resources, geology, elevation, slope, and fault-line items has been created and supplied to the Los Angeles Department of City Planning for the City's portion of the Santa Monica Mountains. In addition, the interactive system contains 173 socio-econimic data items created by merging the Third count U.S. Census Bureau tapes and the Los Angeles County Secured Assessor File. This data can be displayed graphically for each and every block, block group, or tract for 6 test tracts in Woodland Hills, California. Other benefits of LUMIS are the knowledge of air photo availability, flight pattern coverage and frequencies, and private photogrammetry companies flying Southern California, as well as a formal Delphi study of relevant land use informational needs in the Santa Monicas. (See also W78-01589) (Humphreys-ISWS)
W78-01596

SATELLITE INFORMATION ON ORLANDO, FLORIDA,
Brevard County Planning Dept., Titusville, FL.
J. W. Hannah, G. L. Thomas, and F. Esparza.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No. NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 1665-1682, September 1975. 10 fig, 1 ref.

Descriptors: *Mapping, *Florida, *Land classification, *City planning, Maps, Land use, Planning, Rural areas, Cities, Urban mapping, Surveys, Satellites(Artificial), Data processing, Monitoring, Water, Marshes, Trees.
Identifiers: *Orlando(Fla), *Orange County(Fla), LANDSAT, Skylab, Thematic maps.

An effective means of coordinating the utilization of Skylab and LANDSAT data is use of the Skylab photography to make generalized land use maps of the larger areas, such as counties and regions, followed by use of multi-spectral scanner data from LANDSAT and Skylab, where available, to provide more detailed information for whatever portion of that area may be needed. This approach has been followed for Orange County, Florida. In Orange County EREP photography was used to prepare a land use map of the county, and LANDSAT and EREP MSS data were used to provide more detailed information on Orlando and its suburbs. The generalized maps were prepared by tracing the patterns on an overlay, using an enlarging viewer. Digital analysis of the multi-spectral scanner data was basically the maximum likelihood classification method, with training sample input and computer printer mapping of the results. It was concluded that: (1) computer classification, accompanied by human interpretation and manual simplification, can produce land use maps which are useful on a regional and county and, for special purposes, a city basis, and (2) change-monitoring is a potentially effective application of such data at all planning levels. (See also W78-01589) (Humphreys-ISWS)
W78-01597

IMPROVED RESOURCE USE DECISIONS AND ACTIONS THROUGH REMOTE SENSING,
Michigan State Univ., East Lansing.
For primary bibliographic entry see Field 6B.
W78-01599

DEVELOPMENT OF USER APPLICATIONS FOR EARTH RESOURCES SURVEY DATA IN URBAN AND REGIONAL PLANNING IN THE PUGET SOUND AREA,
Washington Univ., Seattle.
F. V. Westerlund.

Descriptors: *Regional analysis, *Land use, *Remote sensing, *Washington, City planning, Planning, Census, Land classification, Monitoring, Decision making, Data processing, Maps, Management.
Identifiers: *Pudget Sound(Wash).

User applications of remote sensing in Washington State are being developed by programs of the State

Department of Natural Resources, the University of Washington, and the Pacific Northwest Regional Commission. The Remote Sensing Applications Laboratory of the University of Washington has been involved for three years in developing applications in urban and regional planning in the Puget Sound area through cooperative programs with governmental agencies. Two such activities were described. The first project created a multitemporal land use/land cover data base for the environs of the Seattle-Tacoma International Airport to serve planning and management operations of the Port of Seattle. The second project is an ongoing effort to develop a capability within the Puget Sound Governmental Conference, a council of governments, to inventory and monitor land use within its four-county jurisdiction. Developmental work has focused on refinement of land use/cover classification systems applicable at this regional scale and various levels of detail in relation to program requirements of the agency. Related research, refinement of manuual methods, user training, and approaches to technology transfer were discussed. (See also W78-01589) (Humphreys-ISWS)
W78-01600

APPLICATION OF SATELLITE REMOTE-SENSING DATA,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 7C.
W78-01601

PRESENT AND POTENTIAL LAND USE MAPPING IN MEXICO,
Mexican Water Plan, Mexico City. Physical Resources and Water Uses Group.
H. Garduno, R. Garcia Lagos, and F. Gardia Simo.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No. NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 1823-1839, September 1975. 8 fig, 5 tab, 3 ref.

Descriptors: *Land use, *Mapping, *Mexico, *Remote sensing, Foreign countries, Surveys, Land classification, Census, Erosion, Water resources, Planning, Vegetation, Irrigated land, Forests, Maps, Agriculture, Manpower, Costs.
Identifiers: LANDSAT.

The Mexican Water Plan conducted studies of present and potential land use in Mexico using LANDSAT-1 satellite imagery. Present land use studies were carried out all over the country (197 million hectares); nine soil uses were mapped according to the first classification level recommended by the U.S. Geological Survey. Also, 6.3 million hectares of land with advanced erosion were detected. Work was executed at a rate of 8 million hectares per month; reliability was 90% and the cost was only 0.1 cents/hectare. The potential land use study was performed in 45 million hectares at a rate of 4 million hectares per month and at a cost of 0.33 cents/hectares. Soil units, according to FAO classification, were delineated scale 1:1 million; interpretative maps also were prepared, dealing with potential agricultural productivity carrying capacity for cattle, water, erosion risk, and slope ranges. The integration of both present and potential land use maps is extremely useful in providing orientations for regional development of water resources in agricultural countries with sparse water suplies. (See also W78-01589) (Humphreys-ISWS)
W78-01603

APPLICATION OF LANDSAT AND SKYLAB DATA FOR LAND USE MAPPING IN ITALY,
Central Lab. for Geophotogrammetry and Remote Sensing, Munich (West Germany).
J. Bodechetel, J. Nithack, G. Di Bernardo, K. Hiller, and F. Jaskolla.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No. NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 1863-1886, September 1975. 14 fig, 2 tab, 1 ref, 1 append.

Descriptors: *Land use, *Mapping, *Remote sensing, *Foreign countries, *Europe, Surveys, Maps, Land classification, Census, Surface waters, Agriculture, Forests, Glaciers, Snow cover, Cities, Analytical techniques.
Identifiers: *Italy, LANDSAT, Skylab.

Utilizing LANDSAT and Skylab multispectral imagery of 1972 and 1973, a land use map of the mountainous regions of Italy was evaluated at a scale of 1:250,000. Seven level I categories were identified by conventional methods of photointerpretation. Images of multispectral scanner (MSS) bands 5 and 7, or equivalents, were used. If the quality of the data is good and if the interpreter has a general knowledge of the country, categories of levels II to IV can be mapped. Areas of less than 200 by 200 m could be classified. It is possible to establish standard procedures for interpretation of multispectral satellite imagery. In this manner, land use maps can be produced for central and southern Europe. The results proved that the existing land use maps could be updated and optimized. The complexity of European land use patterns, the intensive morphology of young mountain ranges, and time-cost calculations are the reasons that the applied conventional techniques are, for the near future, superior to automatic evaluation. (See also W78-01589) (Humphreys-ISWS)
W78-01604

RAINFALL ANALYSIS FOR DRAINAGE DESIGN, VOLUME I, SHORT-DURATION PRECIPITATION FREQUENCY,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 2B.
W78-01648

RAINFALL ANALYSIS FOR DRAINAGE DESIGN, VOLUME II, LONG-DURATION PRECIPITATION DATA,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 2B.
W78-01649

A PROCEDURE USED FOR A GROUND TRUTH STUDY OF A LAND USE MAP OF NORTH ALABAMA GENERATED FROM LANDSAT DATA,
National Aeronautics and Space Administration, Huntsville, AL. George C. Marshall Space Flight Center.
For primary bibliographic entry see Field 7C.
W78-01651

4B. Groundwater Management

STUDIES ON SALINIZATION OF GROUNDWATER, 1. THEORETICAL CONSIDERATION ON THE THREE-DIMENSIONAL MOVEMENT OF THE SALT WATER INTERFACE CAUSED BY THE PUMPAGE OF CONFINED GROUNDWATER IN FAN-SHAPED ALLUVIUM,
Ehime Univ., Matsuyama (Japan). Dept. of Applied Physics.
For primary bibliographic entry see Field 2F.
W78-01287

DIFFUSE FLOW AND CONDUIT FLOW IN LIMESTONE TERRAIN IN THE MENDIP HILLS, SOMERSET (GREAT BRITAIN),
University of East Anglia, Norwich (England). School of Environmental Sciences.
For primary bibliographic entry see Field 2F.
W78-01288

SILICATE SCALE CONTROL IN GEOTHERMAL BRINES,
Occidental Research Corp., La Verne, CA.
For primary bibliographic entry see Field 3A.
W78-01316

WATER RESOURCES DATA FOR MISSISSIPPI, WATER YEAR 1976.
Geological Survey, Jackson, MS. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01317

WATER RESOURCES DATA FOR MICHIGAN, WATER YEAR 1975.
Geological Survey, Okemos, MI. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01318

WATER RESOURCES DATA FOR CONNECTICUT, WATER YEAR 1976.
Geological Survey, Hartford, CT. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01319

WATER RESOURCES DATA FOR ARIZONA, WATER YEAR 1975.
Geological Survey, Tucson, AZ. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01320

WATER RESOURCES DATA FOR WISCONSIN, WATER YEAR 1975.
Geological Survey, Madison, WI. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01321

WATER RESOURCES DATA FOR HAWAII AND OTHER PACIFIC AREAS, WATER YEAR 1975.
Geological Survey, Honolulu, HI. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01322

WATER RESOURCES DATA FOR INDIANA, WATER YEAR 1976.
Geological Survey, Indianapolis, IN. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01323

WATER RESOURCES DATA FOR IDAHO, WATER YEAR 1975.
Geological Survey, Boise, ID. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01324

WATER RESOURCES DATA FOR IOWA, WATER YEAR 1976.
Geological Survey, Iowa City, IA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01326

WATER RESOURCES DATA FOR OHIO, WATER YEAR 1976--VOLUME 1. OHIO RIVER BASIN.
Geological Survey, Columbus, OH. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01328

WATER RESOURCES DATA FOR OHIO, WATER YEAR 1976--VOLUME 2. ST. LAWRENCE RIVER BASIN.
Geological Survey, Columbus, OH. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01329

WATER RESOURCES DATA FOR PENNSYLVANIA, WATER YEAR 1976--VOLUME 1. DELAWARE RIVER BASIN.
Geological Survey, Harrisburg, PA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01330

WATER RESOURCES DATA FOR PENNSYLVANIA, WATER YEAR 1976--VOLUME 2. SUSQUEHANNA AND POTOMAC RIVER BASINS.
Geological Survey, Harrisburg, PA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01331

WATER RESOURCES DATA FOR PENNSYLVANIA, WATER YEAR 1976--VOLUME 3. OHIO RIVER AND ST. LAWRENCE RIVER BASINS.
Geological Survey, Harrisburg, PA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01332

WATER RESOURCES DATA FOR TEXAS, WATER YEAR 1976--VOLUME 1. ARKANSAS RIVER BASIN, RED RIVER BASIN, SABINE RIVER BASIN, NECHES RIVER BASIN, TRINITY RIVER BASIN AND INTERVENING COASTAL BASINS.
Geological Survey, Austin, TX. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01333

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collection program, and are published as miscellaneous measurements. Records for a few pertinent stations in bordering States are also included. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Texas. (See also W78-01333) (Woodard-USGS)
For primary bibliographic entry see Field 7C.
iver and intervening Coastal basins. Data consis

WATER RESOURCES DATA FOR TEXAS, WATER YEAR 1976--VOLUME 3. COLORADO RIVER BASIN, LAVACA RIVER BASIN, GUADALUPE RIVER BASIN, NUECES RIVER BASIN, RIO GRANDE BASIN AND INTERVENING COASTAL BASINS.
Geological Survey, Austin, TX. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01335

WATER RESOURCES DATA FOR ALASKA, WATER YEAR 1975.
Geological Survey, Anchorage, AL. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01336

WATER RESOURCES DATA FOR MAINE, WATER YEAR 1976.
Geological Survey, Augusta, ME. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01337

WATER RESOURCES DATA FOR NEW MEXICO, WATER YEAR 1975.
Geological Survey, Albuquerque, NM. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01338

WATER RESOURCES DATA FOR SOUTH DAKOTA, WATER YEAR 1976.
Geological Survey, Huron, SD. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01339

WATER RESOURCES DATA FOR NEW HAMPSHIRE AND VERMONT, WATER YEAR 1975.
Geological Survey, Boston, Mass. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01340

WATER RESOURCES DATA FOR MASSACHUSETTS AND RHODE ISLAND, WATER YEAR 1975.
Geological Survey, Boston, Mass. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01341

ADVANCED WASTEWATER TREATMENT INCLUDES REVERSE OSMOSIS.
For primary bibliographic entry see Field 5D.
W78-01440

THE ROLE OF STATE LEGISLATION IN GROUND WATER MANAGEMENT,
Arizona Univ., Tucson. Coll. of Law.
R. E. Clark.
Creighton Law Review, Vol. 10, No. 3, March, 1977, p 469-487.

Descriptors: *Groundwater, *Groundwater resources, *Water policy, *Water management(Applied), *Legislation, Legal aspects, Government, Prior appropriation, Regulation, Management, Water rights, Groundwater mining, Southwest U.S., Arizona, California, New Mexico, Texas, Administration, Public benefits, Property rights, Correlative rights.

Groundwater legislation and administration are compared in New Mexico, Arizona, California, and Texas, and problem areas are outlined. A comparison of groundwater law in each state reveals four different legal doctrines. Texas' 'absolute ownership,' California's 'correlative rights,' and Arizona's 'reasonable use' doctrines are essentially rules of private property whereas New Mexico's 'prior appropriation' doctrine is a form of public control. New Mexico law is undergoing changes especially in areas where groundwater supplies are being mined and traditional doctrine cannot be applied. Although there is great variety in groundwater law there are three indispensable elements: maximizing benefits, providing allocation procedures among users in the same class and among competing uses with attention to the relative value of different uses, and providing central responsibility and a management system. Three ways of exercising management control are discussed: restricting property rights; internalizing costs; and direct regulation of withdrawals. Western states have thus far failed in their legislative efforts to provide an adequate framework of public control or to sufficiently emphasize the interrelationships of all resources. The author urges a detailed review of the National Water Commission's recommendations on groundwater management. A list of ten indispensable elements in any groundwater management legislation is offered. (Ullery-Arizona)
W78-01503

ENVIRONMENTAL DEVELOPMENT PLAN (EDP): HYDROTHERMAL ENERGY SYSTEMS FY 1977.
Energy Research and Development Administration, Washington, DC.
Report EDP/G 01(77), June 1977. 9 p, 13 fig, 2 tab, 4 append.

Descriptors: *Geothermal studies, *Environment, *Safety, *Public health, *Standards, Air pollution, Water pollution, Environmental sanitation, Environmental effects, Environmental control, Energy, Subsidence, *Hydrothermal studies, Socioeconomics, Seismicity.

The environmental, health, safety, social, and economic issues that are associated with the development, demonstration, and commercialization of hydrothermal resources and conversion technology and ERDA actions required to resolve the issues are identified. The hydrothermal resource development, conversion technology development, and demonstration projects currently in progress, or planned by ERDA, are listed with schedules and milestones for fiscal year 1977 noted. The ERDA program comprises environmental, health, and safety issued including air and water quality, subsidence, seismicity, socioeconomics, and institutional constraints related to these issues. The ERDA environmental program is described in terms of strategy; responsibility; projects; operations monitoring; environmental, health, and safety effects; environmental control and impact abatement; environmental standards and criteria. The appendices present a forecast guide for active geothermal development areas, discussion of environmental issues, environmental research supporting the resolution of environmental issues, and elements of the hydrothermal environmental projects. (Wares-IPA)
W78-01546

WATER SUPPLY AT LOS ALAMOS DURING 1976,
Los Alamos Scientific Lab., NM.
W. D. Purtymun.
Available from the National Technical Information Service, Springfield, VA 22161 as LA-6814-PR, Price codes: A03 in paper copy, A01 in microfiche. Report LA-6814-PR, May 1977. 30 p, 21 fig, 5 tab, 9 ref, 1 append. W-7405-Eng.36.

Descriptors: *Water supply, *Water wells, Aquifers, Deep-well pumping, *New Mexico, *Los Alamos(N Mex).

Pumpage and aquifer conditions for wells in the Los Alamos, Guaje, and Pajarito, New Mexico, well fields are summarized in order to indicate the status of the water supply at Los Alamos during 1976. The Los Alamos water supply for 1976 consisted of production of 1,691 x 1,000,000 gallons from wells in three fields and 4 x 1,000,000 gallons from the gallery in Water Canyon. Under current production practices, water-level trends are as anticipated. The production from the well field was from 15 wells. (Well LA-6 is on standby status to be used only in emergency). The loss of this well has resulted in greater production from wells LA-1B, LA-4, and LA-5 in the field. The construction of a new well in the Pajarito Field has been delayed. An exceedingly dry summer or loss of a high-yield well during a peak demand period will result in a water shortage. Continued rehabilitation of older wells is encouraged to ensure a dependable supply and efficient use of already established

booster stations and transmission lines. The appendix presents a summary of Los Alamos municipal well-field characteristics in terms of aquifer conditions and capacities. (Wares-IPA)
W78-01547

EXPERIENCE IN THE USE OF THE METHOD OF MICROELECTRICAL VERTICAL SOUNDINGS IN STUDYING IRRIGATED SOIL EVOLUTION, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of General Soil Science.
For primary bibliographic entry see Field 2F.
W78-01559

LEAKAGE OF GROUNDWATER THROUGH A SLOT IN A SHEET PILE,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8D.
W78-01632

APPARATUS AND PROCESS FOR DRAWING WATER FROM A WATER-BEARING STRATA,
Thyssen Plastik Anger K.G., Munich (West Germany).
L. Fink.
U.S. Patent No 4,014,387, 6 p, 6 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 956, No 5, p 1669-1670, March 29, 1977.

Descriptors: *Patents, *Wells, *Water wells, Casings, Well casings, Permeability, Pumps, Sands, Well filters, Water pollution sources.

The invention provides an improved apparatus and process for drawing sand-free water from wells drilled in water-bearing strata. The water is flowed from water-bearing strata into a perforated wall of the well. The water is then flowed through a permeable body and subsequently the water is pumped from the well. The apparatus may comprise a perforated tubular filter element defining a well wall and a cylindrical permeable body placed concentrically within the well wall. The lower end of the body is closed and the upper end is open and connected to a pump. The cylindrical body may comprise concentric outer and inner slotted cylinders with a granulate defining a permeable body or a permeable cylinder between the concentric tubes. (Sinha-OEIS)
W78-01695

4C. Effects On Water Of Man's Non-Water Activities

NOTES ON SEDIMENTATION ACTIVITIES, CALENDAR YEAR 1973.
Federal Highway Administration, Washington, DC.
For primary bibliographic entry see Field 2J.
W78-01185

HEAVY RAINFALL RELATIONS OVER CHICAGO AND NORTHEASTERN ILLINOIS,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 2B.
W78-01292

CONTROL OF EROSION AND SEDIMENT DEPOSITION FROM CONSTRUCTION OF HIGHWAYS AND LAND DEVELOPMENT,
Environmental Protection Agency, Washington, DC. Office of Water Programs.
For primary bibliographic entry see Field 4D.
W78-01315

FERTILIZATION TO ACCELERATE LOBLOLLY PINE FOLIAGE GROWTH FOR EROSION CONTROL,
Forest Hydrology Lab., Oxford, MS.
For primary bibliographic entry see Field 4D.
W78-01345

APPLICATION OF SEWAGE SLUDGE TO CROPLAND: APPRAISAL OF POTENTIAL HAZARDS OF THE HEAVY METALS TO PLANTS AND ANIMALS.
Council for Agricultural Science and Technology, Ames, IA.
For primary bibliographic entry see Field 5C.
W78-01513

REMOTE SENSING IMPACT ON CORRIDOR SELECTION AND PLACEMENT,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 7C.
W78-01598

APPLICATION OF SATELLITE REMOTE-SENSING DATA,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 7C.
W78-01601

THREE EXAMPLES OF APPLIED REMOTE SENSING OF VEGETATION,
Texas A and M Univ. College Station.
For primary bibliographic entry see Field 7C.
W78-01602

4D. Watershed Protection

NOTES ON SEDIMENTATION ACTIVITIES, CALENDAR YEAR 1973.
Federal Highway Administration, Washington, DC.
For primary bibliographic entry see Field 2J.
W78-01185

PROCEEDINGS OF THE FEDERAL INTER-AGENCY SEDIMENTATION CONFERENCE, BUREAU OF RECLAMATION, DENVER, COLORADO, MAY 6-8, 1947.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-245 379, Price codes: A00 in paper copy, A01 in microfiche. SED/COM-01. January 1948. 323 p.

Descriptors: *Sedimentation, *Conferences, *Reservoir silting, *Programs, *Laboratory tests, *Rivers, Canals, Sediment discharge, Aggradation, Instrumentation, Degradation(Streams), Estuaries, Bed load, Surveys, Model studies, Floodways, Erosion, Erosion control. Sediment control, Land management, Watershed management, Bank stabilization, Stream erosion.

This publication contained the 24 papers and discussions of the first Federal inter-agency sedimentation conference. The conference was a working conference in which representatives of Federal agencies confronted with sedimentation problems could discuss the problems and the methods being used for problem investigations and solution. The 218 engineers in attendance represented federal agencies, state agencies, universities, and other organizations. The broad topics covered included: statements of sedimentation problems; agency sedimentation programs; determination and identification of sediment load; reservoir sedimentation; rivers, floodways and canals; laboratory investigations; and sedimentation control. (See also W77-00775) (Humphreys-ISWS)
W78-01188

DATA FOR A SMALL WATERSHED, IT IS POSSIBLE TO DEFINE THE SIMPLEST KINEMATIC CASCADE GEOMETRY WHICH WHEN USED IN SIMULATION WILL PRESERVE SELECTED HYDROGRAPH CHARACTERISTICS TO A GIVEN DEGREE OF ACCURACY. (SIMS-ISWS)
d to coordinate data from topographic maps by a least-square procedure. Residuals of the fit formed a geometric goodness-of-fit statistic as the improvement over using the mean elevation. An overall goodness-of-fit statistic was the drainage density ratio, the ratio of drainage density in the cascade of planes and channels to drainage density of the watershed. Given rainfall, runoff, and topograph
For primary bibliographic entry see Field 2A.
echniques for and consequences of such simplifica

AN EROSION EQUATION DERIVED FROM BASIC EROSION PRINCIPLES,
Purdue Univ., Lafayette, IN. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2J.
W78-01295

A RUNOFF EROSIVITY FACTOR AND VARIABLE SLOPE LENGTH EXPONENTS FOR SOIL LOSS ESTIMATES,
Purdue Univ., Lafayette, IN. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2J.
W78-01296

EVALUATING COMPONENTS OF THE USDAHL HYDROLOGY MODEL APPLIED TO GRASSLAND WATERSHEDS,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2A.
W78-01297

RUNOFF AND EROSION CHARACTERISTICS OF SURFACE-MINED SITES IN WESTERN NORTH DAKOTA,
North Dakota State Univ., Fargo. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2J.
W78-01298

EVALUATION OF SEDIMENT CONTROL DAMS,
Pennsylvania Dept. of Transportation, Harrisburg. Bureau of Materials, Testing and Research.
W. G. Weber, Jr., and C. Wilson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-253 040, Price codes: A03 in paper copy, A01 in microfiche. Report No FHWA-PA-76-7321, March 1976. 34 p, 19 fig, 17 tab, 1 append.

Descriptors: *Dams, *Sediment control, *Sedimentation, *Evaluation, Bed load, Suspended load, Erosion, Trap efficiency, Channels, Dam construction, Construction, Excavation.

The Pennsylvania Department of Transportation has used small dams extensively to control erosion in waterways. This report presented the results of evaluation of the performance characteristics of the small dams as to their efficiency in removing sediment load from the flowing water. A comparison also was made of the various methods of constructing these small dams. The results indicated that only a small portion of the suspended materials were removed by the dams. However, it was pointed out that the dams were very efficient in trapping the bed load. (Bhowmik-ISWS)
W78-01313

ACOP PUMPING SAMPLER. ALLUVIAL RIVER MECHANICS PROJECT,
Colorado State Univ., Fort Collins. Engineering Research Center.
K. Mahmood, and G. L. Eyster.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-244 181, Price codes: A03 in paper copy, A01 in microfiche. Report CER74-75 KM-GLE 39, March 1975. 29 p, 7 fig, 1 ref, 3 append. NSF ENG 72-00274-A01.

Descriptors: *Measurement, *Instrumentation, *Sediment distribution, *Suspended load, Suspended solids, Sediment transport, Laboratory tests, Alluvial channels, Rivers, Sampling, Pumping.
Identifiers: *Sediment samplers, *Sediment measurement, Sediment concentration, Pumping samplers, Integrating samplers.

A point integrating pumping sampler for suspended sediment in sand size and finer ranges was described. The sampler uses a positive displacement pump driven by a D.C. motor. The discharge of the pump is regulated by its speed. A sampler was designed on the premise that the average velocity at the sampling point is known and that representative samples can be obtained by maintaining the intake velocity at the same rate. The sampler can be operated in a Cartridge Sampling Mode when large volumes of the sampled flow are sieved through 230 mesh U.S. Standard Sieve or in a Pint Bottle Mode, when nearly instantaneous samples are obtained in pint bottles. (Adams-ISWS)
W78-01314

CONTROL OF EROSION AND SEDIMENT DEPOSITION FROM CONSTRUCTION OF HIGHWAYS AND LAND DEVELOPMENT,
Environmental Protection Agency, Washington, DC. Office of Water Programs.
R. E. Thronson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-258 418, Price codes: A04 in paper copy, A01 in microfiche. EPA Report, September 1971. 50 p, 38 fig, 45 ref.

Descriptors: *Erosion control, *Sedimentation, *Erosion, *Construction, *Land development, Cost allocation, Cost sharing, Costs, Runoff, Deposition(Sediments), Highways.

Sedimentation involves three basic processes: erosion, transportation, and deposition. Costs of correcting erosion and sediment deposition problems resulting from highway construction and land development activities often unjustifiably are transferred to the taxpayer. The costs result when consequences of the construction operations on downstream areas are not properly considered. The report discussed deposition and control methods. (See also W72-02106) (Bhowmik-ISWS)
W78-01315

FERTILIZATION TO ACCELERATE LOBLOLLY PINE FOLIAGE GROWTH FOR EROSION CONTROL,
Forest Hydrology Lab., Oxford, MS.
P. D. Duffy.
Research Note SO-230, 4 p. 1977. Southern Forest Experiment Station, New Orleans, La.

Descriptors: *Erosion control, *Loblolly pine trees, *Vegetation establishment, *Fertilization, Slope protection, Gulf Coastal Plain, Mississippi, Nutrient requirements, Phosphates, Nitrogen components.
Identifiers: Pinus taeda L., Ammonium nitrate, Superphosphate, Potash, Ureaform.

On the southern Coastal Plain, loblolly pine (Pinus Taeda L.) can be used to help control erosion because it produces abundant soil-protecting litter. The species requires several years to produce enough litter for adequate soil protection, but on loamy soils fertilization can reduce the time by a year or more. When five fertilizer combinations were tested, one application of N at 150 lb/acre together with P at 33 lb/acre, and K at 62 lb/acre was best. Seedlings fertilized with this combination produced 1.6 times the foliage weight of unfertilized seedlings through their first 2 years without decreased survival. Additions of N up to 300 lb/acre in several small applications may further stimulate foliage growth. Foliage growth responses to fertilization were smaller on sandy soils and occurred only for seedlings planted in a year with normal summer rainfall. No response occurred on sandy soils in a dry year. The pattern of height growth response to fertilization during the first 2 years paralleled that of foliage growth. (Forest Service)
W78-01345

ETHEPHON ADVANCES LOBLOLLY PINE NEEDLE CAST,
Forest Hydrology Lab. Oxford, MS.
For primary bibliographic entry see Field 2D.
W78-01347

DESIGNATION OF NEW RIVER SEGMENT AS A COMPONENT OF THE WILD AND SCENIC RIVERS SYSTEM.
For primary bibliographic entry see Field 6E.
W78-01365

THE FISHES OF THE SANDUSKY RIVER SYSTEM, OHIO,
Ohio State Univ., Columbus.
For primary bibliographic entry see Field 5C.
W78-01527

HELLEY-SMITH BED LOAD SAMPLERS,
Agricultural Research Service, Boise, ID.
For primary bibliographic entry see Field 2J.
W78-01641

SOIL EROSION AND DUST CONTROL ON ARIZONA HIGHWAYS. PART IV: FINAL REPORT-FIELD TESTING PROGRAM,
Arizona Transportation and Traffic Inst., Tucson.
H. A. Sultan.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-260 603, Price codes: A07 in paper copy, A01 in microfiche. Report ADOT-RS-13(141), February 1976. 138 p, 22 fig, 19 tab, 11 ref, 3 append. 40 M 4-082, HPR-1-10-(141) 72-29.

Descriptors: *Erosion control, *Soil stabilization, *Highways, *Wind erosion, *Soil erosion, Dusts, Embankments, Oil, *Arizona, *Aerospray 70, Surfaseal, Petroset SB, Coherex, Dresinate DS-60W-80F, Paracol 1461, Terakrete No. 2, Dust stop, Foramine 99-194, Norlig 41+F-125, Dust Bond 100+F-125, Curasol AE.

Several chemical stabilizers were used in a large scale field application, based on a laboratory testing program. To control dust and wind erosion on untrafficable areas, spray-on application of eleven chemicals was made. Five chemicals were used on an unpaved road using a spray-on application to control erosion and dust behind traffic. Three chemicals were also used on the unpaved road using a mixed-in application. Methods of field application are given; details of monitoring techniques, including Hi-Vol dust collection, dust fall collection in cups, and extraction tests are discussed. Results indicate availability of several chemicals that proved successful in controlling dust on untrafficable areas. Degrees of dust control exceeding 88%, as compared with control sections, were achieved using chemical treatments costing between 4.3 cents and 10.9 cents per square yard. These chemicals were: Terakrete No. 2, Surfaseal, Dust Control Oil Aerospray 70, Norlig 41+F-125, and Paracol 1461. The field monitoring technique, using the Hi-Vol and blower combination appears to serve as a good method for quantitatively assessing the degree of effectiveness of a chemical treatment in collecting dust. In the road tests, Dust Control Oil, Aerospray 70, Dust Bond 100+F-125 and Curasol AE provided excellent control at a cost between 21.5 and 47.2 cents per square yard. The mixed-in application of the chemicals provided excellent degrees of dust control after exposure to traffic at a cost of 21.5 to 53 cents per square yard for a 3-inch thick mat. Field evaluation methods, using the Hi-Vol dust collection and the dust-fall collection (using cups), appear to provide a good numeric estimate for the effectiveness of the chemical treatments. Only Dust Control Oil provided a reasonable degree of dust control behind traffic using the spray-on application. The mixed-in application of the Redicote E52 asphalt emulsion provided an excellent degree of dust control behind traffic along with a good wearing surface after 15 months of exposure. Dust Control Oil Failed in the laboratory, but performed well in the field. (Wares-IPA)
W78-01658

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

RAPID DETERMINATION OF TOTAL ORGANIC CARBON AND ITS APPLICATION TO WATER RESEARCH (IN JAPANESE).
T. Yoshikura, I. Fukunago, K. Oda, S. I. Kawai, and G. Uno.
Bull Jpn Soc Sci Fish 42(12): 1423-1429. 1976.

Descriptors: *Organic compounds, Chemical oxygen demand, Biochemical oxygen demand, *Carbon, *Oxidation, Rivers.

The quality of water polluted with organic compounds is usually expressed in terms of COD (chemical O2 demand) or BOD (biochemical O2 demand). Recently, a rapid combustion method for measuring total organic C (TOC) content of water was developed. The determination of TOC in the river water polluted with organic compounds was attempted and compared with other pollution parameters: BOD, COD, NH4-N and bacterial counts. The measurement of TOC was not significantly influenced by the presence of toxic substances, biodegradability, chemical structure, molecular weight of organic substances or their susceptibility to chemical oxidants. TOC correlated well with BOD, COD, NH4-N, Kjeldhal-N, and bacterial counts. TOC measurement provides rapid and accurate analysis of the extent of organic pollution in water.
W78-01197

SEASONAL DYNAMISM OF NITROGEN FIXERS AND CELLULOSE DEGRADING MICROORGANISMS IN WATERS AND SEDIMENTS OF THE DANUBE RIVER. (IN FERBO-CROATIAN),
Institute for Biological Research, Belgrade, (Yugoslovia).
O. Simic.
Arh Biol Nauka 25(3/4): 167-176. 1973. (English summary).

Descriptors: *Nitrogen fixation, *Danube River, Cellulose, Wood wastes, *Microbial degradation, Sediments.

Aerobic N fixers (bacteria) and aerobic cellulose degrading microorganisms of the Danube River have not yet been researched. Samples of the Danube water and sediments were taken from the left bank, right bank and middle course. These samples were collected during April, Aug. and Oct. 1972 and Feb. 1973. They were collected on 2

transverse profiles upstream of Zemun (1179 km) and Visnijica (1162 km) (Yugoslavia). A quantitative determination of the aerobic N fixers and cellulose degrading microorganisms was performed on slica gel. The N fixers showed clearly seasonal variations; the cellulose degrading microorgaisms did not.--Copyright 1977, Biological Abstracts, Inc.
W78-01211

SAMPLING AND ANALYSIS OF MINNESOTA TRIBUTARIES AND MUNICIPAL POINT SOURCES TO LAKE SUPERIOR.
Minnesota Pollution Control Agency, Roseville.
For primary bibliographic entry see Field 5B.
W78-01229

AMBIENT AIR CONTAMINATION BY MICRON AND SUBMICRON PARTICLES FROM WELDING OPERATIONS,
Lund Inst. of Tech. (Sweden). Dept. of Nuclear Physics.
H. O. Lannefors, and K. R. Akselsson.
Bulletin of Environmental Contamination and Toxicology, Vol. 17, No. 5, p 521-527, May, 1977. 1 fig, 3 tab, 9 ref.

Descriptors: *Air pollution, *Metals, *Environmental effects, *Analytical techniques, *X-ray analysis, Iron, Potassium, Manganese, Particle size, Air pollution effects, Path of pollutants, Sampling, Industrial wastes, *Pollutant identification.
Identifiers: Welding wastes, X-ray emission analysis, Impactor sampling.

Impactor sampling and analysis of size fractions by particle-induced X-ray emission analysis (PIXE) is suggested as a means of distinguishing industrial particulate matter from particulate matter of other origins. Two rooftop samplings in downtown and industrial areas in a small Swedish town were equipped with single orifice cascade impactors of Bat elle design to collect micron- and submicron-sized airborne particulates. Size distribution of particulates containing sulfur, iron, potassium, manganese, zinc, and lead indicated that trends in size could be used to define possible sources for fractions of the particulate matter. In this example, fumes from adjacent welding operations were indicated as the source of iron, potassium, and manganese. Multi-element analysis with PIXE in combination with impactor sampling is recommended for detecting the influence of fugitive emissions and ventilation air on ambient air quality. (Schulz-FIRL)
W78-01251

ELECTROPLATING AND CYANIDE WASTES, (LITERATURE REVIEW),
Utah State Univ., Logan.
For primary bibliographic entry see Field 5D.
W78-01262

DETERMINATION OF TRACE ELEMENT CONTAMINATION OF SEDIMENTS BY MULTIELEMENT ANALYSIS OF CLAY-SIZE FRACTION,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 2H.
W78-01311

WATER RESOURCES DATA FOR MISSISSIPPI, WATER YEAR 1976.
Geological Survey, Jackson, MS. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01317

WATER RESOURCES DATA FOR MICHIGAN, WATER YEAR 1975.
Geological Survey, Okemos, MI. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01318

WATER RESOURCES DATA FOR CONNECTICUT, WATER YEAR 1976.
Geological Survey, Hartford, CT. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01319

WATER RESOURCES DATA FOR ARIZONA, WATER YEAR 1975.
Geological Survey, Tucson, AZ. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01320

WATER RESOURCES DATA FOR WISCONSIN, WATER YEAR 1975.
Geological Survey, Madison, WI. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01321

WATER RESOURCES DATA FOR HAWAII AND OTHER PACIFIC AREAS, WATER YEAR 1975.
Geological Survey, Honolulu, HI. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01322

WATER RESOURCES DATA FOR INDIANA, WATER YEAR 1976.
Geological Survey, Indianapolis, IN. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01323

WATER RESOURCES DATA FOR IDAHO, WATER YEAR 1975.
Geological Survey, Boise, ID. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01324

WATER RESOURCES DATA FOR IOWA, WATER YEAR 1976.
Geological Survey, Iowa City, IA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01326

WATER RESOURCES DATA FOR OHIO, WATER YEAR 1976--VOLUME 1. OHIO RIVER BASIN.
Geological Survey, Columbus, OH. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01328

WATER RESOURCES DATA FOR OHIO, WATER YEAR 1976--VOLUME 2. ST. LAWRENCE RIVER BASIN.
Geological Survey, Columbus, OH. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01329

WATER RESOURCES DATA FOR PENNSYLVANIA, WATER YEAR 1976--VOLUME 1. DELAWARE RIVER BASIN.
Geological Survey, Harrisburg, PA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01330

WATER RESOURCES DATA FOR PENNSYLVANIA, WATER YEAR 1976--VOLUME 2. SUSQUEHANNA AND POTOMAC RIVER BASINS.
Geological Survey, Harrisburg, PA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01331

WATER RESOURCES DATA FOR PENNSYLVANIA, WATER YEAR 1976--VOLUME 3. OHIO RIVER AND ST. LAWRENCE RIVER BASINS.
Geological Survey, Harrisburg, PA. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01332

WATER RESOURCES DATA FOR TEXAS, WATER YEAR 1976--VOLUME 1. ARKANSAS RIVER BASIN, RED RIVER BASIN, SABINE RIVER BASIN, NECHES RIVER BASIN, TRINITY RIVER BASIN AND INTERVENING COASTAL BASINS.
Geological Survey, Austin, TX. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01333

WATER RESOURCES DATA FOR TEXAS, WATER YEAR 1976--VOLUME 2. SAN JACINTO RIVER BASIN, BRAZOS RIVER BASIN, SAN BERNARD RIVER BASIN AND INTERVENING COASTAL BASINS.
Geological Survey, Austin, TX. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01334

WATER RESOURCES DATA FOR TEXAS, WATER YEAR 1976--VOLUME 3. COLORADO RIVER BASIN, LAVACA RIVER BASIN, GUADALUPE RIVER BASIN, NUECES RIVER BASIN, RIO GRANDE BASIN AND INTERVENING COASTAL BASINS.
Geological Survey, Austin, TX. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01335

WATER RESOURCES DATA FOR ALASKA, WATER YEAR 1975.
Geological Survey, Anchorage, AL. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01336

WATER RESOURCES DATA FOR MAINE, WATER YEAR 1976.
Geological Survey, Augusta, ME. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01337

WATER RESOURCES DATA FOR SOUTH DAKOTA, WATER YEAR 1976.
Geological Survey, Huron, SD. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01339

WATER RESOURCES DATA FOR NEW HAMPSHIRE AND VERMONT, WATER YEAR 1975.
Geological Survey, Boston, Mass. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01340

WATER RESOURCES DATA FOR MASSACHUSETTS AND RHODE ISLAND, WATER YEAR 1975.
Geological Survey, Boston, Mass. Water Resources Div.
For primary bibliographic entry see Field 7C.
W78-01341

EVALUATION OF SEWAGE TREATMENT FACILITIES, SAN FRANCISCO, CALIFORNIA, SEPTEMBER 1975.
National Enforcement Investigations Center, Denver, CO.
For primary bibliographic entry see Field 5D.
W78-01409

CHLORINATED WASTEWATER OUTFIT IS PORTABLE.
Water and Pollution Control, Vol 115, No 8, p 28, August, 1977.

Descriptors: *Hydrogen ion concentration, *Dissolved oxygen analyzers, *Chlorine, *Analytical techniques, *Monitoring, Equipment, *Pollutant identification, Instrumentation, Chemical analysis, Effluents, Waste water treatment, *Chlorination.
Identifiers: Hydrogen ion concentration meters, Chlorine meters.

The LaMotte Chemical Products Company of Chestertown, Maryland, produces a combination monitoring unit (Model MH-3) for chlorine, dissolved oxygen, and pH. For use with chlorinated waste water discharges, the unit includes a waterproof carrying case, solid state electrical components, and a combination electrode. It is a lightweight field instrument which uses a DPD-FAS titration procedure to determine free and combined chloride over a 0.1-5.0 ppm range. Dissolved oxygen in the 0-20 ppm range is determined with a microburette procedure in an Azide modification of the Winkler method. A battery-operated LaMotte pH meter is provided to measure pH from 0 to 14 within 0.1 pH units. (Schulz-FIRL)
W78-01473

THE DETERMINATION OF TRACE ACRYLAMIDE IN WATER AND SLUDGE (MIZUOYOBI SURAJJI NAKA NO BIRYO AKURIRUAMIDO NO TEIRYO HO),
H. Nakamura.
Suido Kyokai Zasshi, No. 514, p 37-41, July, 1977. 5 fig, 2 tab, 11 ref.

Descriptors: *Analytical techniques, *Gas chromatography, *Mass spectrometry, *Polymers, Organic wastes, Chemical analysis, Sludge, Waste water, Water analysis, Sea water, *Path of pollutants, *Pollutant identification.
Identifiers: *Acrylamide.

Trace acrylamide concentrations in municipal water, artificial seawater, and sewage sludge were measured with a gas chromatograph-mass spectrometer equipped with an electron capture detector. The sample containing acrylamide was brominated with the addition of a large amount of KBr and 0.1% M KBr03. The gas chromatograph column was filled with 15% EGS and the Florisil clean-up method was used in the determinations. With this method the detection range for acrylamide was 0.1-1,000 ng/liter. With the use of the standard addition method in the analysis of municipal water, artificial seawater, and sludge, acrylamide was determined within 86-93% with a relative standard deviation of less than 2%. (Schulz-FIRL)
W78-01475

OPTIMAL USE OF INSTRUMENTAL NEUTRON AND PHOTON ACTIVATION ANALYSES FOR MULTIELEMENT DETERMINATIONS IN SEWAGE SLUDGES,
Dalhousie Univ., Halifax (Nova Scotia). Dept. of Chemistry.
A. Chattopadhyay.
Journal of Radioanalytical Chemistry, Vol. 37, No. 2, p 785-799, 1977. 4 tab, 28 ref.

Descriptors: *Neutron activation analysis, *Analytical techniques, *Pollutant identification, *Irradiation, *Trace elements, Chemical analysis, Fertilizers, Sludge, Chemical reactions, Municipal wastes, Industrial wastes, Metals, Sewage disposal, Waste water treatment.
Identifiers: *Photon activation analysis.

A procedure involving a combination of instrumental neutron activation analysis (INAA) and photon activation analysis (IPAA) for multielement determinations in a variety of sludges and fertilizers is described. The method was devised in experiments with raw and anaerobically digested chemically conditioned sludges, agricultural lime, N-P-K fertilizers, ammonium nitrate, muriate of potash, Milorganite, cattle manure, and sewage-based fertilizers. Details of the neutron and photon irradiation of the samples are presented. Experiments on the INAA method indicated that a total of 50 elements could be measured in sludge samples with 15 min and 60 hr irradiation times. Irradiation periods of 2 min and 6 hr allowed measurements of 36 elements with the IPAA method. Nuclear data for the elements detected with the methods are presented, including activation reactions, product half-lives, gamma-ray energy, and decay times. Replicate analyses of a homogenized chemical sludge sample were used to evaluate the reproducibility and accuracy of both methods. The analyses indicated that the standard deviations of most of the elements examined were 5-10% of the mean value. The choice of the analytical method should be based on the irradiation facilities available. (Schulz-FIRL)
W78-01476

EXPERIENCES WITH THE ALGAL ASSAY PROCEDURE (ERFAHRUNGEN MIT DER ALGAL ASSAY PROCEDURE),
Hoechst A.G., Frankfurt am Main (West Germany). Pflazenschutzforschung-Biologie.
P. Hartz.
Gas- and Wasserfach, Wasser-Abwasser, Vol. 118, No. 8, p 272-278, 1977. 6 fig, 7 tab, 6 ref.

Descriptors: *Algae, *Analytical techniques, *Eutrophication, *Sulfates, *Chemical analysis, Environmental effects, Algicides, Iron compounds, Waste water treatment, *Pollutant identification, *Bioassay.
Identifiers: *Algal assay procedure.

The Algal Assay Procedure was studied with respect to its suitability for the assessment of the eutrophication of biological purified waste water and of surface water bodies. Bottle tests with purified waste water from the last biological stage revealed that precipitation with aluminum sulfate causes a considerable reduction of the algal growth compared with that observed before precipitation. Tests with Rhine water showed that iron (II) sulfate is unsuitable for the precipitation of phosphates, if the phosphate sludge can not be removed within a short time, because the phosphate may be remobilized. Moreover, considerable growth stimulation of Anabaena flos-aquae was observed in surface water treated with iron (II) sulfate, which can be explained by the specific stimulating effect of iron. By contrast, the algal growth was significantly depressed in water treated with aluminum sulfate. (Takacs-FIRL)
W78-01478

COMPARISON OF FOUR-HOUR AND TWENTY-FOUR-HOUR REFRIGERATED STORAGE OF NONPOTABLE WATER FOR FECAL COLIFORM ANALYSIS,
Wisconsin Univ.-Madison. Dept. of Natural Resources.
J. H. Standridge, and D. J. Lesar.
Applied and Environmental Microbiology, Vol. 34, No. 4, p 398-402, October, 1977. 1 tab, 14 ref.

Descriptors: *Sampling, *Analytical techniques, *Coliforms, *Sewage bacteria, *Microbiology, Water analyses, Testing procedures, Statistics, Sewage treatment, *Bioassay, *Pollutant identification, Municipal wastes, Industrial wastes, Waste water treatment.
Identifiers: Sample storage, Membrane filter technique, Fecal coliforms.

Fecal coliform levels observed in water samples stored for 4 hr at 4C were compared with those observed in the samples after 24 hr of storage. Samples for analysis were obtained for secondary sewage treatment plants receiving only domestic wastes, from plants receiving a combination of municipal and industrial wastes, and from rivers and streams receiving a mixture of municipal and agricultural wastes. The membrane filter technique was used in the 30 replicate analyses of each sample at 4- and 24-hr periods. The 5-day biochemical oxygen demand in mg/liter was measured for each sample. A statistical comparison of theanalyses conducted for 4- and 24-hr storage periods indicated that fecal coliform levels obtained were equivalent within the 95% confidence interval for all but three sampling sites. Two of three sites were reported as grossly overloaded sewage plants producing a poor final effluent, and the third was one in which vacuum filtration was used after final clarification. the test results suggested that storage of samples for 24 hr could result in reliable analyses with economic and qualitative advantages over storage for 4 hr. (Schulz-FIRL)
W78-01479

ANALYSIS FOR TOXIC SUBSTANCES PRESENT IN WASTE WATER FOR BIOLOGICAL PURIFICATION PURPOSES (PRUEFUNG VON ABWASSERINHALTSSTOFFEN AUF GIFTWIRKUNG FUER DIE BIOLOGISCHE KLAERSTUIE),
Eidgenoessische Materialpruefungs- und Versuchsanstalt, Sankt Gallen (Switzerland). Vorsteher der Abt. Chemie.
W. Schefer.
Gas-Wasser-Abwasser, Vol. 57, No. 7, p 520-523, 1977. 4 fig, 1 tab, 7 ref.

Descriptors: *Analytical techniques, *Activated sludge, *Toxicity, *Oxygen demand, *Chemical analysis, Sludge digestion, Sludge treatment, Biological treatment, Microorganisms, Waste water treatment, *Pollutant identification.

A simple method for testing inorganic and organic substances for their toxicity with respect to the activated sludge of biological waste water treatmrnt plants is described. The substance to be tested is added in various concentrations ranging from 5 to 1,000 mg/liter to activated sludge taken from biological waste water treatment plants, and the resulting reduction in the oxygen consumption is determined by a known (barometric, coulometric, etc.) method. Substances which reduce the oxygen consumption to 50% in concentrations over 500 mg/liter are considered as nontoxic or low toxicity, while substances with LC50 under 100 mg/liter are highly toxic to the activated sludge. (Takas-FIRL)
W78-01480

PERFORMANCE INVESTIGATION OF THE MANNING MODEL S-4000 PORTABLE WASTEWATER SAMPLER AND THE MODEL F-3000 DIPPER FLOWMETER,
Environmental Monitoring and Support Lab., Cincinnati, OH.
P. R. Lauch.

Available from the National Technical Information Service, Springfield, VA 22161 as PB-266 150, Price codes: A04 in paper copy, A01 in microfiche. Report EPA-600/4-76-059, December 1976. 62 p, 13 fig, 23 tab, 4 ref, 1 append.

Descriptors: *Water sampling, *Data collections, *Flowmeters, *Laboratory tests, *Water analysis, On-site data collections, Equipment, Analytical techniques, Laboratory equipment, Reliability, Operation and maintenance, Sewage treatment, Monitoring, Effluents, Waste water treatment, Sampling.
Identifiers: Waste water samplers, Manning model S-4000 portable waste water sampler, Manning model F-3000 dipper flowmeter.

The objective of this study was to examine the operation and performance of two automatic monitors used in waste water treatment plants, the Manning model S-4000 waste water sampler and the Manning model F-3000 flowmeter. Descriptions of the two monitoring devices are presented. The sampler was tested in a laboratory environmental chamber at temperatures of 2, 20 and 35C. Accuracy and precision, multiplexer runs, multiple bottle sampling, battery endurance, sample preservation with ice, sample representativeness, and reliability were evaluated. Tracking, analog to digital conversion, electronic drift, deadband, and overall accuracy and precision were evaluated in laboratory tests of the flowmeter. Results of laboratory studies indicated that the overall design and performance of the devices tested were above average when compared with similar equipment available for use in waste water treatment plants. Deadband or backlash in the gearing which produced an error of 11.63-6.14% was considered the most serious shortcoming of the flowmeter. In field tests with treatment plant influent and effluent, the sampler reliably collected suspended solids and raw sewage while left unattended for a 24-hr period. (Schulz-FIRL)
W78-01516

CHEMICAL/BIOLOGICAL IMPLICATIONS OF USING CHLORINE AND OZONE FOR DISINFECTION,
Minnesota Univ., Duluth. Dept. of Chemistry.
For primary bibliographic entry see Field 5C.
W78-01517

REMOTELY SENSED AND LABORATORY SPECTRAL SIGNATURES OF AN OCEAN-DUMPED ACID WASTE,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
B. W. Lewis, and V. G. Collins.
Available from the National Technical Information Service, Springfield, VA 22161 as NASA-TN-D-8467, Price codes: A03 in paper copy, A01 in microfiche. Report NASA TN D-8467, 1977. 36 p, 12 fig, 3 tab, 6 ref, 1 append. 176-30-31-11.

Descriptors: *Spectrometers, *Mathematical models, *Water pollution, *Oceans, *Iron, Acidic water, Waste water(Pollution), Reflectance, Waste disposal, *Pollutant identification, *Remote sensing, Plumes.

A rapid scanning spectrometer remotely measured ocean radiance from a helicopter to study an ocean-dumped acid waste plume. An ocean spectral reflectance signature and a laboratory spectral transmission signature were established for the iron-acid waste pollutant. The spectrally and chemically significant component of the acid waste pollutant was determined to be ferric iron. The concentration of the acid waste in the plume was determined with a simple mathematical model using the remotely sensed ocean spectral reflectance of the plume and the laboratory spectral transmissivity as a function of iron concentration. The method compares the shape (color) of the spectral reflectance curves, calculated for various iron concentrations from laboratory transmissivity data, with the remotely measured spectral radiance curves of the plume. The calculated curve that most nearly matches the shape (color) of the plume curve gives the estimated concentration of iron in the plume at the point of measurement. The agreement with sea-truth iron concentration was quite good in the limited number of stations where good remote spectral data were obtained. The results indicate the remotely sensed monitoring of acid waste is feasible. (Wares-IPA)
W78-01545

DETECTION OF FILAMENTOUS IRON BACTERIA IN OPEN RECIRCULATING COOLING WATER SYSTEMS,
H. E. Hilliard.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-267 117, Price codes: A02 in paper copy, A01 in microfiche. Report of Investigations 8204, 1976. 11 p, 3 fig, 5 ref, 3 append.

Descriptors: *Microorganisms, *Iron bacteria, Water supply, Sampling, Water pollution, Testing procedures, Pollutant identification, Methodology, Analytical techniques, *Millipore Total Count Sampler.

A method for detecting and counting filamentous iron bacteria in open recirculating cooling water systems was investigated. Samples from 26 water systems were examined, cultivating cells on commercially prepared media (the Millipore Total Count Sampler). Cultures grew well on this medium and were identified as filamentous iron bacteria by microscopic examination and by their ability to deposit iron using the Prussian blue reaction. Results demonstrated that most cooling water systems are likely to contain filamentous iron bacteria and that they can be detected and counted with the Millipore sampler. The procedure described is simpler and faster than conventional techniques for microbiological detection and enumeration such as the pour plate method. Three appendices present information on aseptic technique of inoculation or transfer of a culture, preparation of a smear, and glycerol glutamate medium. (Wares-IPA)
W78-01548

WORKSHOP ON NUCLEAR TECHNIQUES FOR ENVIRONMENTAL TRACE ELEMENT INFORMATION RELATIVE TO ENERGY PRODUCTION AND CONSUMPTION, FLORIDA STATE UNIVERSITY, TALLAHASSEE, JUNE 23-26, 1974.
National Science Foundation, Washington, DC.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 964, Price codes: A03 in paper copy, A01 in microfiche. August 1974. 45 p, 3 tab, 18 ref, append. GP-44333.

Descriptors: *Analytical techniques, *Environment, *Nuclear physics, Air pollution, Water pollution, Aerosols, Measurement, Methodology, *Trace elements, Biology, Energy.

A summary of workshop viewpoints and problems and technical summaries of workshop discussions is presented. Participants generally agreed that recent refinements in nuclear techniques for trace elements measurement now make possible new advances in the investigation of the flow of material through the environment and of the impact of trace elements on the biosphere and man. Problems addressed by the workshop included: flow of materials through the environment, perturbations by energy-intensive activities, trace element impacts on man and the biosphere, the place of trace elements in immediate national environmental missions, potential for nuclear techniques to meet environmental research and monitoring needs, and evaluation of nuclear techniques for environmental trace element research by examples of aerosol studies. The workshop set forth two long-term objectives needed in federal funding of environmental trace elements research: continuing research in important areas and the generation of manpower for continuing research. The special role of nuclear scientists in environmental trace elements research is seen as the transfer of identification with original specialties to emphasis on environmental quality, characterized by a high level of mass interdisciplinary interaction. Technical papers on air pollution research; interlaboratory data comparison; aerosol composition, collection, and analysis; environmental sampling; particulate sampling and analysis; nuclear methods of analysis; water pollution; and biological systems are summarized. The appendix contains statements by persons unable to attend the workshop, a workshop outline, and a list of attendants. (Wares-IPA)
W78-01550

DETERMINATION OF HARMFUL QUANTITIES AND RATES OF PENALTY FOR HAZARDOUS SUBSTANCES. VOLUME I. EXECUTIVE SUMMARY,
Battelle-Northwest, Richland, WA. Pacific Northwest Lab.
G. W. Dawson, M. W. Stradley, and A. J. Shuckrow.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 793, Price codes: A03 in paper copy, A01 in microfiche. Report EPA-440/9-75-005-a, 1975. 33 p, 4 fig, 2 tab. EPA-68-01-2268.

Descriptors: *Water pollution, *Accidents, *Regulation, *Penalties(Legal), Law enforcement, Econometrics, Resources, Methodology, Value, Cost allocation, Freshwater, Saline water, Lakes, Estuaries, Water quality standards.
Identifiers: *IMCO/GESAMP methodology, DOHM methodology, *Hazardous materials.

Four methodologies for use in developing regulatory control programs for the prevention and/or removal of spills of hazardous substances as required under Section 311 of the Water Pollution Control Act of 1972 are summarized. Specific hazardous substances, their harmful quantities, and penalty rates for spills were designated. The resource value methodology directs attention to the economic value of environmental resources and the potential loss as a result of hazardous material spillage, defining a threshold dollar value selected through a decision analysis process. Rates of penalty derive from the value of resources lost. The modified IMCO/GESAMP methodology is a procedure designating harmful quantities and rates of penalty based on a proposed international hazardous material rating/classification system which has been submitted to the United Nations for adoption. This methodology utilizes the system to profile hazardous materials on the basis of their relative hazard potentials, relegating materials to categories, determining critical concentration, and then deriving a harmful quantity and base rate of penalty for each category using the resource value methodology. The penalty rate is then modified for individual hazardous materials by an adjustment factor based on hazard potential properties. The unit of measurement methodology addresses legalities using common trade practice measurement and fixed monetary guidelines. The Division of Oil and Hazardous Materials (DOHM) methodology uses a simplified plug flow model to assess the quantity of a hazardous material (harmful quantity) which when spilled is capable of inflicting substantial harm to key aquatic organisms in a stream. The rate of penalty is equated to the cost that would have been incurred by the discharger had preventive measures been instituted. (See also W78-01552 and W78-01553) (Wares-IPA)
W78-01551

DETERMINATION OF HARMFUL QUANTITIES AND RATES OF PENALTY FOR HAZARDOUS SUBSTANCES,
Battelle-Northwest, Richland, WA. Pacific, Northwest Lab.
For primary bibliographic entry see Field 5G.
W78-01552

DETERMINATION OF HARMFUL QUANTITIES AND RATES OF PENALTY FOR HAZARDOUS SUBSTANCES,
Battelle-Northwest, Richland, WA. Pacific Northwest Lab.
For primary bibliographic entry see Field 5G.
W78-01553

LEUCOCRIT: A SIMPLE HEMATOLOGICAL TECHNIQUE FOR MEASURING ACUTE STRESS IN SALMONID FISH, INCLUDING STRESSFUL CONCENTRATIONS OF PULP MILL EFFLUENT,
British Columbia Research Council, Vancouver.
For primary bibliographic entry see Field 5C.
W78-01564

ANNUAL BOOK OF ASTM STANDARDS. PART 31. WATER.
American Society for Testing and Materials, Philadelphia, PA.
1977. 1108 p.

Descriptors: *Water quality standards, *Water analysis, Water, Specifications, Sampling, Flow measurement, Water properties, Acidity, Alkalinity, Hydrogen ion concentration, Conductivity, Corrosion, Hardness(Water), Odor, Surface tension, Chemical oxygen demand, Oxidation-reduction potential, Toxicity, Turbidity, Dissolved solids, Suspended solids, Inorganic compounds, Metals, Anions, Cations, Organic matter, Oil, Pesticides, Herbicides, Phenols, Surfactants, Polychlorinated biphenyls, Radioactivity, Radioisotopes, Bacteria, Sediments, Chemicals, Ion exchange, Membranes, Heavy water, Water treatment.
Identifiers: Hydrazine.

This volume (one of a 48-volume set) comprises the testing and analytical standards of Committee D-19 on water. The 9 sections deal with definitions, specifications, reagents, and reporting of results; sampling and flow measurement; general properties of water (acidity, alkalinity, pH, conductivity, corrosivity, hardness, odor, surface tension, COD, redox potential, toxicity, turbidity, particulate and dissolved solids, etc.); inorganic constituents (metals, nonmetals, cations, anions, hydrazine, etc.); organic constituents (including waterborne oils, pesticides and herbicides, phenolic compounds, surfactants, PCB's, etc.); radioactivity (including specific radionuclides and heavy water); bacteriological examination; water-formed deposits; and water-treatment materials (chemicals, ion-exchangers, and membrane filters). A numeric list of standards and a subject index are included. (Brown-IPC)
W78-01576

THE EFFECT OF ANAEROBIOSIS ON MEASUREMENT OF SULFITE PULP MILL EFFLUENT CONCENTRATION IN ESTUARINE WATER BY U.V. SPECTROPHOTOMETRY,
Fisheries and Marine Service, St. Andrews (New Brunswick).
D. J. Wildish, N. J. Poole, and D. D. Kristmanson.
Bulletin of Environmental Contamination and Toxicology, 16, No 2, p 208-213, 1976. 1 fig, 12 ref, 3 tab.

Descriptors: *Pulp wastes, *Anaerobic conditions, *Sulfite liquors, *Water analysis, *Spectrophotometry, *Sea water, Wastes, Industrial wastes, Water pollution sources, Pulp and paper industry, Effluents, Lignins, Microbial degradation, Ions, Air, Nitrogen, Filters, Filtration, Sterilants, Storage.
Identifiers: Lignosulfonates, Bisulfite, Spent pulping liquor.

Dissolved substances in effluents from the sulfite pulping process consist of approximately one-third soluble carbohydrates (principally hexoses and pentoses) and two-thirds lignin and lignosulfonates. Because of their persistent nature, lignins and lignosulfonates are frequently used to measure sulfite mill effluent concentration. Two potential errors were found in the determination of sulfite pulp mill effluents in seawater by ultraviolet spectrophotometry: loss of absorption due to microbial degradation of lignosulfonates, particularly under anaerobic conditions, and interference due to bisulfite ion under anaerobic conditions. Interference due to bisulfite can be removed by purging with air or nitrogen. Field samples sterilized by filtration through 0.22 or 0.45 micrometer membrane filters can be stored at least three months without loss of absorbance. (Buchanan-IPC)
W78-01577

ANALYSIS OF A PULP AND PAPER MILL EFFLUENT PLUME,
Canada Centre for Inland Waters, Burlington (Ontario).
C. K. Minns.
Journal of the Fisheries Research Board of Canada, Vol. 34, No. 6, p 776-783, June, 1977. 8 fig, 7 ref, 4 tab.

Descriptors: *Pulp wastes, *Water analysis, *Pollutant identification, Wastes, Industrial wastes, Water pollution sources, Pulp and paper industry, Effluents, *Lake Superior, Great Lakes, Dyes, Tracking techniques, Waste dilution, Sodium, Carbon, Nitrogen.
Identifiers: *Nipigon Bay(Lake Superior).

Several chemical surveys of a pulp and paper mill effluent plume in Nipigon Bay, Lake Superior, are analyzed to determine the average area and volume contained by a range of isoconcentration boundaries. Sodium, dissolved organic carbon, particulate organic carbon, and particulate organic nitrogen are the chemical variables used to examine changes occurring in the plume. Data are analyzed from three sampling regimes: (1) dye-slug tracking which allows interpretation of time-related processes, (2) surface surveys which indicate the areal extent of the plume, and (3) vertical profile surveys which indicate the degree of depth penetration for effluent components. Dilution dominates in the plume, though the nonconservative substances undergo significant changes. The plume area enclosed in a contour of 1% effluent is approximately 1.5 sq km. Mass balance calculations indicate exchanges occurring between the plume and the older fiber beds in the vicinity of the effluent outfall. (Witt-IPC)
W78-01584

OCEAN COLOR IMAGERY- COASTAL ZONE COLOR SCANNER,
National Aeronautics and Space Administration, Greenbelt, MD. Goddard Space Flight Center.
W. A. Hovis.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No. NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 1989-2003, September 1975. 10 fig, 1 tab.

Descriptors: *Remote sensing, *Oceans, *Pollutant identification, *Coasts, Aircraft, Chlorophyll, Aerial photography, Instrumentation, Sediment distribution, Path of pollutants, Water pollution.

Investigations into the feasibility of sensing ocean color from high altitude for determination of chlorophyll and sediment distributions were carried out using sensors on NASA aircraft coordinated with surface measurements carried out by oceanographic vessels. Spectrometer measurements in 1971 and 1972 led to development of an imaging sensor now flying on a NASA U-2 and the Coastal Zone Color Scanner to fly on Nimbus G in 1978. Results of the U-2 effort have shown the imaging sensor also to be of great value in sensing pollutants in the ocean. Quantification of parameters such as chlorophyll concentration, on a global scale, will require extensive research effort, prior to the launch of the Nimbus G CZCS, to include high altitude aircraft scanner flights coordinated with far more extensive surface truth measurements than have been accomplished to date. (See also W78-01589) (Humphreys-ISWS)
W78-01610

SKYLAB INVESTIGATION OF THE UPWELLING OFF THE NORTHWEST COAST OF AFRICA,
Delaware Univ., Newark. Coll. of Marine Studies.
For primary bibliographic entry see Field 2L.
W78-01611

QUANTITATIVE SUSPENDED SEDIMENT MAPPING USING AIRCRAFT REMOTELY SENSED MULTISPECTRAL DATA,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
For primary bibliographic entry see Field 7B.
W78-01615

NITRATE LEVELS IN ESSEX RIVER WATERS,
Essex Water Co. (England).
For primary bibliographic entry see Field 5B.
W78-01626

AD HOC ADVISORY PANEL ON EVALUATED PHYSICAL PROPERTY DATA IN AID OF AQUEOUS ENVIRONMENTAL PROBLEMS.
National Academy of Sciences and National Research Council, Washington, DC. Numerical Data Advisory Board.
For primary bibliographic entry see Field 5B.
W78-01654

MAJOR, MINOR, AND TRACE ELEMENTS OF BOTTOM SEDIMENTS IN LAKE DU QUOIN, JOHNSTON CITY LAKE, AND LITTLE GRASSY LAKE IN SOUTHERN ILLINOIS,
Illinois State Geological Survey, Urbana.
G. B. Dreher, C. B. Muchmore, and D. W. Stover.
Environmental Geology Note No. 82, August 1977. 37 p, 10 fig, 8 tab, 7 ref.

Descriptors: *Lake sediments, *Illinois, *Elements(Chemical), *Trace elements, Silica, Aluminum, Potassium, Calcium, Magnesium, Iron, Titanium, Manganese, Phosphates, Carbon, Carbon dioxide, Boron, Copper, Cobalt, Nickel, Beryllium, Chromium, Zinc, Strontium, Sampling, Chemical analysis, Clay minerals, Cores, X-ray fluorescence, Spectrometers, Statistical methods.
Identifiers: Factor analysis, Cluster analysis.

Bottom sediments from 3 Southern Illinois lakes, Lake Du Quoin, Johnston City Lake, and Little Grassy Lake, were analyzed chemically for 11 major and minor constituents-SiO2, A1203, K20, Ca0, Mg0, Fe203, Ti02, Mn0, P205, CO2, and total carbon; and 10 trace elements-B, Cu, Co, Ni, Be, Cr, V, Zn, Sr, and Zr. The less-than-two micrometer clay-size fraction was determined by the pipet method. The sediments from Lake Du Quoin and Johnston City Lake have a high clay content in the upper portions of the bottom sediment cores and a low clay content in the lower portions, with a definite transition point demonstrated in 12 of 14 cores. Above the transition point, copper and zinc have maximum concentrations of 476 and 252 ppm, respectively, in Lake Du Quoin and max-

imum concentrations of 238 and 259 ppm, respectively, in Johnston City lake sediments. Copper and zinc have been contributed from external sources. The lower portions of the cores from these 2 lakes and the entire cores from Little Grassy Lake are chemically similar to sediment samples from ancient (Wisconsin and Holocene) Lake Saline. (Visocky-ISWS)
W78-01655

A SOLENOID-ACTUATED CHEMICAL-METERING APPARATUS FOR USE IN FLOW-THROUGH TOXICITY TESTS,
Fish and Wildlife Service, Warm Springs, GA. Southeaster Fish Control Lab.
J. H. Chandler, Jr, and S. K. Partridge.
The Progressive Fish Culturist, Vol. 37, No. 2, p. 93-95, 1975. 1 fig, 5 ref.

Descriptors: *Laboratory equipment, *Instrumentation, *Research equipment, Analysis, Laboratory tests, Testing, Monitoring, Methodology, Equipment, Research and development, Analytical techniques, Bioassay, Pollutant identification, *Flow-through toxicity tests.

The assembly and operation instructions for a simple, easily fabricated, relatively inexpensive and reliable chemical-metering apparatus were presented. The apparatus was suitable for use in long-term studies of the effects of chemicals on aquatic organisms. (Katz)
W78-01665

SPAWNING SUCCESS OF FATHEAD MINNOWS ON SELECTED ARTIFICIAL SUBSTRATES,
Environmental Research Lab., Duluth, MN.
D. A. Benoit, and R. W. Carlson.
The Progressive Fish Culturist, Vol. 39, No. 2, p. 67-69, 1977. 1 tab, 5 ref.

Descriptors: *Spawning, *Artificial substrates, *Fish eggs, *Minnows, Fish reproduction, *Aquiculture, Laboratory animals, Research and development, Laboratory equipment, Laboratory tests, Methodology, Fathead minnow.

Spawning success of fathead minnows (Pimephales promelas) on six different substrates was tested and evaluated. Egg adhesiveness was equally good on cement-asbestos tile and sand-coated stainless steel substrates, but was poor on unaltered stainless steel, shot-peened stainless steel, stainless steel screen, and glass substrates. Viability and number of eggs spawned were not significantly different for any of the substrates tested. These results demonstrate the importance of evaluating laboratory spawning substrates before using them in a life-cycle chronic exposure. (Katz)
W78-01667

DIPHENYL ETHER - ANOTHER MARINE ENVIRONMENTAL CONTAMINANT,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Marine Ecology Lab.
R. F. Addison.
Marine Pollution Bulletin, Vol. 8, No. 10, p. 237-240, 1977. 2 fig, 2 tab, 18 ref.

Descriptors: *Ethers, *Gulls, *Herrings, *Chemical oxygen demand, *Gas chromatography, *Snow, *Precipitation(Atmospheric), *Path of pollutants, *Polychlorinated biphenyls, *Toxicity, Organic compounds, Analytical techniques, Chemical analysis, Canada, Pollutant identification, Tissue analysis, Bioaccumulation, *Seal, *Mackerel, *Cod.

Residues of diphenyl ether, a compound which has been used industrially for several decades, have been found in samples of seawater, lake water and snow, and in fat from fish, a seal and a gull collected from various points around Nova Scotia. (Katz)
W78-01668

TOTAL AND ORGANIC MERCURY IN THE PACIFIC BLUE MARLIN,
Hawaii Univ., Honolulu. Dept. of Agricultural Biochemistry.
C. D. Shultz, D. Crear, J. E. Pearson, J. B. Rivers, and J. W. Hylin.
Bulletin of Environmental Contamination and Toxicology, Vol 15, No 2, p 230-234, 1975. 2 tab, 23 ref.

Descriptors: *Mercury, *Organic compounds, Fish physiology, *Inorganic compounds, Analytical techniques, Chemical analysis, Spectrophotometry, Metals, Water pollution, *Path of pollutants, *Pollutant identification.
Identifiers: Tissue analysis, Bioaccumulation, Biotransformation, *Methyl mercury, Pacific Blue Marlin, Organic mercury.

Samples from muscle, liver, central nervous tissue, and gonads of the marlin were analyzed for total and organic mercury content. Unlike many other studies of mercury contamination in fish summarized in the paper, the authors found a low level of organic mercury in the marlin tissues sampled. The biotransformation of organic mercury to less toxic and more easily excretable inorganic mercury by marline liver and/or intestinal bacteria was postulated as a possible explanation for the low mercury (organic) levels in this species. (Katz)
W78-01673

EFFICIENT ALGORITHMS FOR STATISTICAL ESTIMATION IN COMPARTMENTAL ANALYSIS: MODELLING 60CO KINETICS IN AN AQUATIC MICROCOSM,
Georgia Univ., Athens. Dept. of Statistics and Computer Science.
For primary bibliographic entry see Field 5B.
W78-01676

THE SPECIES DIVERSITY INDEX OF SOME IN-SHORE DIATOM COMMUNITIES AND ITS USE IN ASSESSING THE DEGREE OF POLLUTION ON PARTS OF THE NORTH COAST OF COMWALL,
For primary bibliographic entry see Field 5B.
W78-01678

TRACE METAL CONCENTRATIONS IN TWO SHELLFISH SPECIES OF COMMERCIAL IMPORTANCE,
Raytheon Oceanographic and Environmental Services, Portsmouth, RI.
J. B. Palmer, and G. M. Rand.
Bulletin of Environmental Contamination and Toxicology, Vol. 18, No. 4, p 512-520, 1977. 1 fig, 2 tab, 19 ref.

Descriptors: *Heavy metals, *Trace elements, *Cadmium, *Chromium, *Copper, *Lead, *Nickel, *Zinc, *Commercial shellfish, *Spectrophotometry, Animal physiology, *Animal metabolism, Standards, Mollusks, *Clams, Tissue analysis, Bioaccumulation.

Two species of salt water shellfish were analyzed for whole body concentrations of seven trace metals (Cd, Cr, Cu, Pb, Hg, Ni, Zn). All metal concentrations except Cd were what might be expected on an anatomical basis. The higher levels of Cd in an area considered relatively unpolluted and distant from any major sources of input suggests a natural propensity to concentrate this metal. (Katz)
W78-01681

5B. Sources Of Pollution

IMPORTANCE OF HOMOLOGY IN HYGIENIC STANDARDIZATION OF INDUSTRIAL CONTAMINATION OF WATER BODIES (IN RUSSIAN),
S. N. Cherkinskii, and V. P. Laskina.
Gig Sanit 9. 12-17. 1976. (English summary).

Descriptors: *Organic compounds, *Biological properties, Bodies of water.

Data on hygienic standardization of homologs of various organic compounds in water bodies were analyzed; 14 homlogous series were formed. The data collected makes it possible to forecast the biological effect of certain still unknown components of homolgous series.--Copyright 1977, Biological Abstracts, Inc.
W78-01199

TIME SERIES ANALYSIS ON AMMONIA CONCENTRATION AND LOAD VALUES OF THE RIVER RHINE,
Nijmegen Univ. (Netherlands). Dept. of Analytical Chemistry.
P. J. W. M. Mueskens, and W. G. J. Hensgens.
Water Research Vol. 11, No. 6, p 509-515, 1977. 2 fig, 4 tab, 8 ref.

Descriptors: *Time series analysis, *Statistical methods, *Stochastic processes, *Ammonia, Mathematical studies, Nitrogen compounds, Data collections, Measurement, Sampling, Waste disposal, Frequency, *Waste water disposal, *Path of pollutants.
Identifiers: *Rhine River, Autocorrelation.

The autocorrelation technique was used to statistically evaluate a series of data on ammonia concentrations and load values collected for the Rhine River over a 5-yr period. The purpose of the investigation was to separate observation noise from process fluctuations and to prove the presence of a periodicity or trend in the process. A derivation of the autocorrelation function is presented. Standard deivations and means were calculated for ammonia concentrations and load over 4 biannual periods and the total period of 5 yrs. An autocorrelation program was used to calculate autocorrelograms. Analysis of variance indicated that three factors could cause variance in sample values: analytical errors, sampling errors, and fluctuations in ammonia concentrations. Examination of ammonia concentrations in the time series revealed that ammonia load was a stochastic variable with an annual periodicity and a slightly decreasing trend. For ammonia concentrations distinct trends were observed within but not between the biannual periods. (Schulz-FIRL)
W78-01219

CHARACTERISTICS OF THE RUN-OFF RATE OF POLLUTION LOAD IN AN UNSEWERAGED AREA,
Kansai Univ., Osaka (Japan). Dept. of Engineering.
Y. Wada.
Technology Reports of the Kansai University, No. 18, p 111-120, March, 1977. 4 fig, 4 tab, 7 ref.

Descriptors: *Waste assimilative capacity, *Self purification, Streamflow, *Waste dilution, *Surface waters, Waste treatment, Mathematical models, Streams, Rivers, Hydrologic data, Model studies, Water pollution effects, Environmental effects, Water pollution sources.
Identifiers: Akashi River(Japan).

Studies were conducted on the Akashi River in Japan to determine average loading rates on the river and examine the river's capacity for self-purification. The objectives were to characterize pollutant loading rates in an area which is not serviced by a sewage collection system, and to derive re-

sidence times of various pollutants as a function of their loading rates. A series of mathematical equations to determine residence times and loading rates are presented. Major factors affecting the degree of loading are rainfall, stream characteristics, vegetation, the amount of available pollutants, and previous accumulations. Major factors affecting residence times include permeation, erosion, absorption, and dilution. On-site data collections were used to test the validity of the model in predicting the residence times of BOD, COD, suspended solids, total nitrogen, and total phosphorus. These parameters were measured at five locations along the Akashi River in Tokyo, Yokohama, Nagoya, Osaka, and Kobe. The survey indicated that at average flow rate much of the observed reduction in pollutants occurred over a short distance in the river, while at low flow rates the reduction occurred over a larger distance. (Schulz-FIRL)
W78-01222

SAMPLING AND ANALYSIS OF MINNESOTA TRIBUTARIES AND MUNICIPAL POINT SOURCES TO LAKE SUPERIOR.
Minnesota Pollution Control Agency, Roseville.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-258 526, Price codes: A11 in paper copy, A01 in microfiche. Technical Report EPA-905/4-75-002. 1975. 234 p, 2 fig, 4 tab, 7 ref, 2 append.

Descriptors: *Minnesota, *Water quality, *hydrology, *On-site data collections, *Sampling, Regional analysis, Hydrologic data, Tributaries, River basins, Water pollution sources, Lake Superior, Great Lakes, Treatment facilities, Effluents, Waste water treatment.
Identifiers: Nemadji River(MN), St Louis River(MN).

Results of a sampling program to determine constituent loadings of Minnesota tributaries to Lake Superior are presented. The geology, topography, climate, and population of the area are described. Sampling and analytical techniques used in the study are presented. Stream descriptions and stream flow values comprise the section on hydrology. Effluent standards and characteristics are presented for municipal-industrial discharges. Classification codes for the intrastate and interstate tributaries in the area are listed. Water quality data are given for three sub-basins, including the Nemadji River, the St. Louis River, and Lake Superior. Stream loadings for major tributaries in the sub-basins are given. Effluent quality and loadings are given for the four sewage treatment plants which discharge directly into Lake Superior. Appendices include a summary of tributary and sewage treatment plant loadings, as well as lists of data obtained at tributaries and sewage treatment plants during the study. (Schulz-FIRL)
W78-01229

PHYTOPLANKTON AND PRIMARY PRODUCTIVITY STUDIES; PRELIMINARY REPORT,
Texas A and M Univ., College Station. Dept. of Oceanography.
For primary bibliographic entry see Field 5C.
W78-01278

DISTRIBUTION AND COMPOSITION OF THE SUSPENDED PARTICULATE MATTER IN THE WATERS OF THE DOMES REGION,
National Oceanic and Atmospheric Administration, Seattle, WA. Pacific Marine Environmental Lab.
E. T. Baker, R. A. Feely, J. Nevins, and K. Takahashi.
Deep Ocean Mining Environmental Study (DOMES), Unpublished Manuscript No. 1, 1977. 60 p, 26 fig, 5 tab, 22 ref.

Descriptors: *Particle size, *Plumes, *Environmental effects, *Baseline studies, Resources development, Suspended sediments.
Identifiers: Suspended particulate matter, Manganese nodules, Ocean mining, Particulate matter.

The DOMES (Deep Ocean Mining Environmental Study) project is a multidisciplinary research effort designed to assess the marine environmental impacts resulting from commercial mining of deep-ocean manganese nodules. Results are described of the suspended particulate matter (SPM) program conducted during DOMES cruises RP-8-OC-75 (August 24 to October 16, 1975) and RP-8-OC-76 (February 11 to April 17, 1976) onboard the NOAA ship OCEANOGRAPHER. (NOAA)
W78-01279

REPORT ON EVALUATION OF WASTE SOURCES IN THE MEMPHIS, TENNESSEE AREA.
National Field Investigations Center-Denver, CO.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 330, Price codes: A10 in paper copy, A01 in microfiche. Report EPA-330/2-72-011, 1975. 190 p, 20 fig, 25 tab, 3 append.

Descriptors: *Water pollution sources, *Industrial wastes, *Interceptor sewers, *Mississippi River, Water pollution control, Organic wastes, Monitoring, Environmental effects, On-site data collections, Pollution abatement, Waste water treatment.
Identifiers: Memphis(TN).

The purposes of this study were to analyze waste water discharges from major industries in the Memphis, Tennessee, metropolitan area and to evaluate water quality of the Mississippi River upstream and downstream from the Nonconnah and Wolf interceptor sewers. Background information, waste sources and treatment, and a discussion of in-plant evaluations and results are presented. Average daily loads discharged by the 19 industries recognized as waste sources are given. Effluents of one military installation and one municipal waste water treatment plant were also evaluated. Treatment recommendations for each source of pollution are given. Industries which now discharge or plan to discharge wastes to the Memphis sewer system and do not meet pretreatment requirements were identified. (Schulz-FIRL)
W78-01282

REPORT ON WATER QUALITY AND WASTE-SOURCE INVESTIGATIONS-MISSOURI RIVER AND PAPILLION CREEK, OMAHA, NEBRASKA.
National Field Investigations Center-Denver, CO.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 936, Price codes: A11 in paper copy, A01 in microfiche. Report EPA-330/2-73-001, 1973. 242 p, 4 fig, 9 tab, 12 ref, 8 append.

Descriptors: *Sewerage, *Water quality, *Water pollution control, *Sewerage, *Combined sewers, Municipal wastes, Industrial wastes, Sewage treatment, Effluents, Hydrologic data, On-site data collections, Sampling, Waste water treatment, *Missouri River.
Identifiers: Omaha(NB), Missouri River(NB).

Studies of municipal and industrial waste water treatment facilities, as well as limited stream surveys of the Missouri River and Papillion Creek, were conducted in Omaha, Nebraska, to evaluate water pollution control practices, examine the adequacy of Omaha's sewer system, and evaluate pollution abatement progress. Surveys indicated that municipal and industrial waste water sources discharged daily loads of 135,000 lb BOD and 170,000 lb suspended solids. Removal of BOD and suspended solids by primary treatment at the Missouri River plant was 13% and 22%, respectively. Secondary treatment for all waste waters discharged to the Missouri River was recommended by 1975. An investigation of the sewage system indicated that raw waste water was often by-passed directly to the river. Replacement of the deteriorating combined sewers with separate storm and sanitary sewers was recommended. Principal municipal and industrial waste sources are described. Aspects of the sewerage system which are discussed include diversion structures, grit removal facilities, and lift stations. Results of stream surveys, recommended standards for effluent quality, and the status of water pollution abatement measures in the area are discussed. (Schulz-FIRL)
W78-01283

EFFECTS OF A RECREATIONAL IMPOUNDMENT ON NEARBY NATURAL LAKES: A CASE STUDY,
Wisconsin Univ.-Oshkosh. Dept. of Geology.
For primary bibliographic entry see Field 2H.
W78-01291

RUNOFF FREQUENCY FROM SMALL STORMS AND IMPLICATIONS FOR WATER QUALITY,
Agricultural Research Service, Durant, OK. Water Quality Management Lab.
For primary bibliographic entry see Field 2E.
W78-01294

SIGNIFICANCE OF DIURNAL VARIATIONS IN FECAL COLIFORM DIE-OFF RATES IN THE DESIGN OF OCEAN OUTFALLS,
Caldwell Connell Engineers, Melbourne (Australia).
For primary bibliographic entry see Field 5E.
W78-01471

POLLUTION STUDIES OF TRACE ELEMENTS IN SEDIMENTS FROM THE UPPER SARONIKOS GULF, GREECE,
Democritus Nuclear Research Center, Athens (Greece). Chem. Dept.
A. P. Grimanis, M. Vassilaki-Grimani, and G. B. Griggs.
Journal of Radioanalytical Chemistry, Vol 37, No 2, p 761-773, 1977. 8 fig, 1 tab, 20 ref.

Descriptors: *Trace elements, *Geochemistry, *Estuaries, Soil chemical properties, *Path of pollutants, Water pollution sources, Soil analysis, Heavy metals, Analytical techniques, Neutron activation analysis, Outfalls, Industrial wastes, Municipal wastes, Fertilizers, Waste water disposal, Sediments.
Identifiers: *Saronikos Gulf(Greece).

Instrumentation neutron activation analysis was used to analyze 84 sediment samples collected from Elefsis, Keratsini, and Piraeus Bays of the upper Saronikos Gulf in Greece. Concentrations of 17 elements were measured: As, Ce, Co, Cr, Eu, Fe, Hg, Hf, La, Lu, Rb, Sb, Sc, Sm, Yb, and Z. Isopleths for the concentrations of these elements in the upper Saronikos Gulf were extrapolated from experimental data. Lower and upper limit values of trace element concentrations in sediments are presented. Sediments collected in the vicinity of the Athens sewage outfall exhibited the highest concentrations of Cr, while all the other elements occurred at their greatest concentrations in the Piraeus Harbor region. In general, trace element concentrations were lower for Elefsis Bay than for Keratsini Bay. Industrial plants at the entrance of Piraeus Harbor, the Athens sewage outfall, and industries in the northern and eastern regions of Elefsis Bay were suggested as the major sources for the increased trace element concentrations in upper Saronikos Gulf sediments. (Schulz-FIRL)
W78-01474

THE DETERMINATION OF TRACE ACRYLAMIDE IN WATER AND SLUDGE (MIZUOYOBI SURAJJI NAKA NO BIRYO AKURIRUAMIDO NO TEIRYO HO),
For primary bibliographic entry see Field 5A.
W78-01475

BIODEGRADATION OF POLYMERIC BUILDERS--EXPERIMENTS WITH A C-14 LABELLED SODIUM POLY(ALPHA-HYDROXYACRYLATE),
Solvay and Cie, S.A., Brussels (Belgium). Central Lab.
J. Mulders, and J. Gilain.
Water Research, Vol. 11, No. 7, p 571-574, 1977. 5 fig, 1 tab, 5 ref.

Descriptors: *Polymers, *Biodegradation, *Activated sludge, *Detergents, *Chemical wastes, Microorganisms, Organic wastes, Sewage treatment, Waste water treatment.
Identifiers: Sodium poly(Alpha-hydroxyacrylate).

Eutrophication of surface waters brought about by the use of phosphate-bearing detergents has prefaced this investigation of the biodegradation of polymeric polyelectrolytes, in particular sodium poly(alpha-hydroxyacrylate). Oxygen consumption and mineralization were measured in laboratory experiments. Removal of a C-14 labelled product was investigated in continuous activated sludge tests. Studies indicated that the sludge was capable of rapidly and quantitatively adsorbing the polymer and that microorganisms did not have to adapt to the product. A co-metabolism mechanism of removal is suggested by the high degree of transformation and low mineralization. Tests with acclimated sludge resulted in a higher rate of polymer assimilation and a low rate of mineralization. More than 95% of the polymer was biodegraded. (Schulz-FIRL)
W78-01477

MODELS FOR PREDICTING THE IMPACT OF IRRIGATION ON SOIL SALINITY,
Hebrew Univ., Jerusalem (Israel). Div. of Soil Physics.
For primary bibliographic entry see Field 3C.
W78-01495

MODELING THE IMPACT OF STRIP MINING AND RECLAMATION PROCESSES ON QUALITY AND QUANTITY OF WATER IN MINED AREAS: A REVIEW,
Agricultural Research Service, University Park, PA. Northeast Watershed Research Center.
A. S. Rogowski, H. B. Pionke, and J. G. Broyan.
Journal of Environmental Quality, Vol 6, No 3, July-Sept 1977, p 237-244, 64 ref.

Descriptors: *Model studies, *Strip mine wastes, *Coal mine wastes, *Mine wastes, *Spoil banks, Strip mines, Chemistry, Mine acids, Water pollution sources, Water pollution, Water quality, Evapotranspiration, Erosion, Surface runoff, Temperature, Pyrite, Mathematics.

Current energy conditions require increased strip-mining of shallow coal deposits, yet there is at present no single technique available to assess the future effects of strip mining on the quality and quantity of water. The authors describe the current state-of-the-art with regard to modeling strip-mined areas, choosing specific references helpful in modeling the system mathematically. Two principal questions addressed: (1) what approaches to modeling have others taken; and (2) what data are currently available in the literature and how transferable are they. Summaries of pertinent modeling studies are assembled, as well as a review of concepts and laboratory and field procedures that can be used to model the impact of strip mining on a given site. The current literature includes several studies of acid generation, neutralization, and transformation in strip mine spoil materials, but the processes which determine their rates on the field scale are not well understood. Less is known about spoil water flow, oxygen diffusion, surface runoff, erosion, evapotranspiration, and temperature distribution within the spoil banks. The authors conclude that hydrology of the spoil system could be simulated with standard modeling techniques. Experimentally obtained temperature and oxygen distributions could probably delineate acid-producing areas, assuming pyrite is not limiting, and is evenly distributed throughout a zone. (Ullery-Arizona)
W78-01501

ASSESSMENT OF MATHEMATICAL MODELS FOR STORM AND COMBINED SEWER MANAGEMENT, APPENDIX F: SELECTED COMPUTER INPUT AND OUTPUT,
Battelle Pacific Northwest Labs., Richland, WA. Water and Land Resource Dept.
A. Brandstetter.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-258 644, Price codes: A17 in paper copy, A01 in microfiche. Report EPA-600/2-76-175b, August 1976. 387 p.

Descriptors: *Storm water, *Water management(Applied), *Urban runoff, *Mathematical models, *Computer models, Combined sewers, Water pollution control, Overflow, Sewerage, Urban drainage, Waste water treatment.
Identifiers: Battelle Urban Waste Water Management Model, Chicago Flow Simulation Program, Dorsch Consult Hydrograph-Volume Method, Storm Water Management Model, MIT Urban Watershed Model, SOGREAH Looped Sewer Model, Water Resources Engineers Storm Water Management Model, Storm water management models.

Input data and selected output are presented as part of a general evaluation of storm water management models. Hypothetical catchments and pipe systems were used in simulations. Storm water management models which are considered include: Battelle Urban Waste Water Management Model, Chicago Flow Simulation Program, Dorsch Consult Hydrograph-Volume, Environmental Protection Agency Storm Water Management Model (SWMM), Massachusetts Institute of Technology Urban Watershed Model, SOGREAH Looped Sewer Model, and Water Resources Engineers Storm Water Management Model. (See also W78-03468) (Schulz-FIRL)
W78-01514

SIMULATION OF NUTRIENT LOADINGS IN SURFACE RUNOFF WITH THE NPS MODEL,
Hydrocomp, Inc., Palo Alto, CA.
A. S. Donigian, Jr., and N. H. Crawford.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-270 967, Price codes: A06 in paper copy, A01 in microfiche. Report EPA-600/3-77-065, June 1977. 110 p, 30 fig, 8 tab, 24 ref, 3 append.

Descriptors: *Organic loadings, *Storm water, *Mathematical models, *Nutrients, *Urban runoff, Computer models, Phosphorus, Nitrogen, Iron, Suspended solids, Monitoring, Waste water treatment.
Identifiers: Nonpoint Source Pollutant Loading(NPS) Model, Durham(NC), Watkinsville(GA), East Lansing(MI).

The Nonpoint Source Pollutant Loading (NPS) Model was evaluated for simulation of nutrient loading in surface runoff with one urban and two small agricultural watersheds. The NPS model was used to simulate total solids, total Kjeldahl nitrogen, total phosphorus, and iron for storm runoff over an 18-month period. Phosphorus, total nitrogen, and iron values predicted by the model compared favorably with observed values. Other parameters such as ammonia nitrogen, nitrate nitrogen, and phosphate phosphorus, which are transported in solution rather than in the sediment fraction of surface runoff, were not predicted as accurately. The NPS model is suggested as an adequate means of simulating nutrient loadings on the basis of sediment loss. Application of the model may be limited if subsurface flow in the area being considered is a major portion of total runoff. (Schulz-FIRL)
W78-01515

PROCEEDINGS OF SANDUSKY RIVER BASIN SYMPOSIUM, HELD AT TIFFIN, OHIO ON MAY 2-3, 1975.
International Reference Group on Great Lakes Pollution from Land Use Activities.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-258 262, Price codes: A20 in paper copy, A01 in microfiche. Sponsored by Heidelberg Coll., Tiffin, Ohio. Dept. of Biology., and Bowling Green State Univ., Ohio. Environmental Studies Center. May 1975. 465 p. Edited by D.B. Baker, W.B. Jackson, and B.L. Prater.

Descriptors: *Water pollution, *Land use, *Lake Erie, *Conferences, Hydrogeology, Sediments, Phosphorus, Erosion control, Agriculture, Water quality, Management, Diatoms, Fishes, Mollusks, Benthos, Mercury, *Ohio.
Identifiers: Water quality data, Institutional framwork, *Sandusky River basin(Ohio).

The Sandusky River Basin occupies a 1450 square mile area in Northwestern Ohio and has a population of about 140,000. Within the basin, water quality management objectives include both reduction of adverse impacts on Lake Erie and improvement of stream water quality. Management options include: agricultrual pollution abatement measures, advanced treatment of municipal wastes, flow augmentation from pumped storage upground reservoirs, improved sewer collection systems and more strict home sewage regulations in rural developments. The publication covers the proceedings of the Sandusky River symposium, which includes 34 papers concerned with planning and improvements. (See also W78-01519 thru W78-01534)
W78-01518

INTRODUCTION TO THE SANDUSKY RIVER BASIN,
Heidelberg Coll., Tiffin, OH.
D. B. Baker.
In: Proceedings of the Sandusky River Basin Symposium, Held at Tiffin, Ohio on May 2-3, 1975. p. 2-11. 2 fig, 7 ref.

Descriptors: *River basins, *Water pollution, *Water quality, *Water quality control, *Eutrophication, *Sewage, Ohio, Land use, Rivers, Tributaries, Drainage area, Watersheds(Basins), Dissolved oxygen, Coliforms, Bacteria, Oxygen sag, Sewage treatment, Algae, Lake Erie.
Identifiers: *Sandusky River Basin(Ohio), Sandusky Bay(Ohio).

The Sandusky River in northwestern Ohio is 130.2 mi long, with a basin extending over 1,421 sq mi. The river empties into Lake Erie at Sandusky Bay. The basins population of about 140,000 people is half rural and half urban (cities and small towns). Heavily-wooded banks characterize the river and its tributaries, and help maintain a great diversity of wildlife. A 70-mile segment has been designated an Ohio State Scenic River. The river provides the water supply for the four largest cities, Bucyrus, Upper Sandusky, Tiffin, and Fremont. Seventy per cent of the basin land is devoted to cultivation, 9% is in permanent pasture, 9% is forested, 6% is in other rural uses, and 6% is urban. The average discharge of the river is 946 cu ft/sec. Two sections of the river have serious and chronic oxygen deficiencies. Sewage flow at Bucyrus often exceeds treatment plant capacity, and frequently

more than 50% of the stream flow below the city is treatment plant effluent. Consequently, during low-flow conditions the stream below Bucyrus shows the dissolved-oxgyen sag typical of sewage pollution. Below Fremont, the river often shows anaerobic conditions; in late summer organic wastes from food-processing plants exceed treatment plant capacity. Although the rest of the river is generally free of organic pollution, secondary water quality problems plague the river, including high sediment concentration, turbidity, fecal coliform bacteria, algal blooms, offensive taste and odor, oil and chemical spills, dissolved solids, and hardness. Solutions to these problems are discussed. (See also W78-01518) (Lynch-Wisconsin).
W78-01519

THE GEOLOGIC SETTING OF THE SANDUSKY RIVER BASIN,
Bowling Green State Univ., OH. Dept. of Geology.
For primary bibliographic entry see Field 4A.
W78-01520

DISTRIBUTION OF NON-POINT SOURCES OF PHOSPHOROUS AND SEDIMENT IN THE SANDUSKY RIVER BASIN,
Heidelberg Coll., Tiffin, OH.
D. B. Baker, and J. W. Kramer.
In: Proceedings of Sandusky River Basin Symposium, Held at Tiffin, Ohio on May 2-3, 1975. p. 61-88. 3 fig, 6 tab, 16 ref.

Descriptors: *Water pollution sources, *Phosphorus, *Surface runoff, *River basins, Eutrophication, Nutrients, Runoff, Tributaries, Lake Erie, Watersheds(basins), Water quality control, Water quality, Rivers, Ohio.
Identifiers: *Nonpoint pollution, *Sandusky River Basin(Ohio).

Even though most of the efforts to reduce phosphorus loading into Lake Erie have been concentrated on municipal sewage treatment plants (apparently the major source of phosphorus enrichment in the lake), at least 75% of phosphorus delivered from the Sandusky Basin to Lake Erie comes from nonpoint sources. Data given on phosphorus and sediment balances for five subbasins of the system reflects the status of phosphorus sources before removal measures were begun at sewage treatment plants. Data were collected over a six year period, manually and with automatic sequential samplers. For each subbasin point source inputs of phosphorus were subtracted from total output, which provided an estimate of nonpoint source runoff coefficients. The coefficients for the five subbasins in kg/ha/yr were: Tymochtee, 1.35; Bucyrus, 0.07; Upper Sandusky, 1.29; Mexico, 1.18; and Tiffin, 1.02. The annual yield of total phosphorus from nonpoint sources in the basin was 390 tons, or 77% of the total annual yield. Most of the phosphorus is associated with clay particles which dominate the suspended solids loaded in the stream. The data indicate that nonpoint source phosphorus loading is more uniformly distributed over the landscape than is sediment loading. (See also W78-01518) (Lynch-Wisconsin)
W78-01521

EFFECTS OF ADVANCED WASTE TREATMENT AND FLOW AUGMENTATION ON WATER QUALITY DURING LOW STREAM FLOWS,
Heidelberg Coll., Tiffin, OH. Dept. of Biology.
D. B. Baker, and J. W. Kramer.
In: Proceedings of Sandusky River Basin Symposium, Held at Tiffin, Ohio on May 2-3, 1975. p. 123-142. 5 fig, 2 tab, 12 ref.

Descriptors: *Algae, *Waste treatment, *Water quality control, *Streamflow, *Dissolved oxygen, *River basins, Diurnal, Phosphorus, Sewage treatment, Ohio, Photosynthesis, Nutrients, Eutrophication, Runoff, Chlorophyll.
Identifiers: *Sandusky River Basin(Oh).

Oxygen violations (a dissolved oxygen level below 4.0 mg/l) in the Sandusky River in Ohio are mainly associated with diurnal oxygen fluctuations, indicating that photosynthetic plant metabolism is a major determinant of oxygen concentrations. Attached algae or phytoplankton appear to be responsible for these diurnal oxygen variations. Algal growth often reaches nuisance levels during periods of low stream flow, especially late summer and fall, which also coincides with drops in dissolved oxygen concentrations. Reasons presented for the association of algal increase with decreases in stream flow are: (1) an increase in phosphorus concentrations (due to lower dilution of the constant phosphorus inputs from sewage treatment plants); (2) a decrease in sediment concentrations, which permits greater light penetration; and increase in travel time. It was found that stream flow augmentation monitored in the form of runoff events, would appear to be more effective than phosphorus removal at sewage treatment plants in preventing the development of nuisance levels of algae. Such flow augmentation reduced diurnal oxygen fluctuations and also, therefore, oxygen violations. Nutrient and chlorophyll concentrations were monitored in the basin between June and September of 1974. No significant correlation was found between phosphorus and chlorophyll concentrations, or between chlorophyll concentrations and stream flow. (See also W78-01518) (Lynch-Wisconsin)
W78-01522

PLANKTONIC CENTRIC DIATOMS OF THE SANDUSKY RIVER NEAR FREMONT, OHIO,
Bowling Green State Univ., OH. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W78-01523

SEASONAL DISTRIBUTION OF PERIPHYTIC DIATOMS COMMUNITIES OF TYMOCHTEE CREEK,
Bowling Green State Univ., OH. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W78-01524

PHYTOPLANKTON OF THE SANDUSKY RIVER NEAR FREMONT, OHIO,
Bowling Green State Univ., OH. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W78-01525

A COMPARISON OF THE WINTER DIATOM FLORA OF THE SANDUSKY RIVER AND TYMOCHTEE CREEK,
Bowling Green State Univ., OH. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W78-01526

THE FISHES OF THE SANDUSKY RIVER SYSTEM, OHIO,
Ohio State Univ., Columbus.
For primary bibliographic entry see Field 5C.
W78-01527

SANDUSKY RIVER BORDERS AND RESERVOIRS AS MIGRATORY BIRD REFUGES,
Heidelberg Coll., Tiffin, OH.
For primary bibliographic entry see Field 6G.
W78-01528

THE AQUATIC COLEOPTERA OF THE SANDUSKY RIVER, OHIO,
Bowling Green State Univ., OH. Environmental Studies Center.
For primary bibliographic entry see Field 5C.
W78-01529

THE ECOLOGY OF RUNNING WATERS: THEORY AND PRACTICE,
Michigan State Univ., Hickory Corners. W. K. Kellogg Biological Station.
For primary bibliographic entry see Field 6G.
W78-01530

BENTHIC MICROINVERTEBRATE POPULATIONS OF SANDUSKY BAY,
Ohio State Univ., Put-in-Bay. Center for Lake Erie Area Research.
For primary bibliographic entry see Field 5C.
W78-01531

ABUNDANCE AND POPULATION TRENDS OF SANDUSKY BAY FISHES,
Ohio State Univ., Put-in-Bay. Center for Lake Erie Area Research.
For primary bibliographic entry see Field 5C.
W78-01532

USE OF HEAVY METAL POLLUTION IN SANDUSKY BAY SEDIMENTS TO DETERMINE SEDIMENTATION RATES,
Bowling Green State Univ., OH. Dept. of Geology.
L. J. Walters, Jr., and C. R. Herdendorf.
In: Proceedings of Sandusky River Basin Symposium, Held at Tiffin, Ohio on May 2-3, 1975. p 426-453. 8 fig, 1 tab, 14 ref, 2 append.

Descriptors: *Water pollution, *Sediments, *Mercury, *Lake Erie, Water pollution sources, Pollutants, Chromium, Nickel, Ohio, Water quality.
Identifiers: *Sandusky Bay(Ohio), *Sandusky River Basin(Ohio).

Sediment core samples collected at 60 stations in Sandusky Bay, Sandusky River, Tymochtee Creek, and Broken Sword Creek (Ohio), in September 1972 and January-February 1975 were analyzed for mercury, chromium, and nickel content. The objective of the study were to confirm the nature of pollution in Sandusky Bay sediments, to determine the source of the mercury pollution, and to estimate recent average sedimentation rates using the mercury pollution method of Wolery and Walters. Sandusky Bay sediments averaged 24 ppm chromium and 40 ppm nickel, about the same as Lake Erie background levels of 18 ppm and 45 ppm. Tymochtee and Broken Sword creeks were used as controls, since they are in agricultural areas far from cities. Chromium and nickel levels in the two creeks averaged 13 and 25 ppm respectively and were not considered significantly different from the bay sediments. Mercury levels in Sandusky Bay were 10-20 times above the background levels established for the two creeks, which averaged 0.031 ppm Hg (dry weight) in the less than 60 mesh fraction. The Sandusky Bay sediments ranged from 0.10 to 0.80 ppm Hg (dry weight). In the Sandusky River the highest level was recorded downstream from the Bucyrus Sewage Treatment Plant (0.7 ppm). Average sedimentation in Sandusky Bay was calculated at 0.3 to 2.0 cm./yr, higher in the western bay than the eastern bay. (See also W78-01518) (Lynch-Wisconsin)
W78-01533

SOME BRIEF REFLECTIONS ON THE SYMPOSIUM, THESE PROCEEDINGS AND WATER QUALITY STUDIES IN THE SANDUSKY RIVER BASIN,
Heidelberg Coll., Tiffin, OH.
D. B. Baker.

In: Proceedings of Sandusky River Basin Symposium, Held at Tiffin, Ohio on May 2-3, 1975. p 473-475.

Descriptors: *River basins, *Water quality, *Water pollution, *Watersheds(Basins), *Rivers, *Aquatic life, Ohio, Sedimentation, Fish, Insects, Plankton, Algae, Birds, Water quality control, Eutrophication, Sewage, Tributaries, Water pollution sources, Runoff, Erosion, Ecology, Bays, Streams.
Identifiers: *Sandusky River Basin(Ohio).

The Sandusky River Basin Symposium, held at Heidelberg College in Tiffin, Ohio on May 2-3, 1975, was sponsored by Heidelberg and Bowling Green State University. The program included 34 papers, of which 21 are published in full and 13 as abstracts in these Proceedings. The Sandusky River and its tributaries occupy a 1,450 sq mi area in northwestern Ohio; the Sandusky River empties into Lake Erie at Sandusky Bay. The papers covered geology, nonpoint sources of phosphorus and sediment, soil surveys, erosion control, water quality studies, flow augmentation effects, phytoplankton (including centric and periphytic diatoms), zooplankton, fish, naiad mollusks, migratory birds, benthic macroinvertebrates, aquatic coleoptera, ecology of running waters, vascular plants, shoreline and bathymetric changes, heavy metal pollution, watershed planning, NPDES permits, agency cooperation, and citizen input. The major goal of the symposium was to foster information exchange. Presented data will allow more accurate assessments of water quality and will facilitate setting of priorities for pollution abatement programs. These studies should also prove relevant to programs in other river basins. (See also W78-01518) (Lynch-Wisconsin)
W78-01534

WATER RESOURCES PLANNING FOR RIVERS DRAINING INTO MOBILE BAY: A USERS' MANUAL FOR THE TWO DIMENSIONAL HYDRODYNAMIC MODEL,
Alabama Univ., University. Dept. of Chemical Engineering.
S. Ng, and G. C. April.
Available from the National Technical Information Service, Springfield, VA 22161 as N76-18630, Price codes: A06 in paper copy, A01 in microfiche. Interim Report, BER Report No. 203-112. Prepared for the National Aeronautics and Space Administration, Marshall Space Flight Center, Alabama, January 1976. 97 p, 33 fig, 1 tab, 10 ref, append.

Descriptors: Hydrodynamics, *Mathematical models, *Rivers, *Tides, *Bays, Water resources, Planning, Behavior, Computer models, Weirs, Marshes, Water quality, Ships, Channels, Bottom sampling, Drainage, Systems analysis.
Identifiers: *Mobile Bay(Ala), Water movement, *Tidal elevation, Water depth, Sea boundaries, Water cell segments, Mean sea level, Wind conditions, Natural systems.

To better understand the complex, interactive effects influencing water movement and water quality in natural systems, several mathematical models based on the laws of conservation of mass, momentum and energy have been developed. Models describing the hydrodynamic and material transport behavior of Mobile Bay, Alabama have been formulated and tested. Demonstrated is how the model which describes water movement and tidal elevation is formulated, computed and used to provide basic data about the system, using Mobile Bay in a case study with comments as to how the formulations might be expanded to describe other areas which qualify under model restrictions as assumptions. The hydrodynamic model is based on two-dimensional, unsteady flow equations. Results can be calculated for unsteady flow when boundary conditions are available as a function of time (dynamic), or for quasi-steady flow when conditions are stable for a time period encompassing several tidal cycles or longer priods. The solutions of the equations have been used to investigate the influence that river discharge rate, wind direction and speed, and tidal condition have on water circulation and holdup within the bay. The report has four parts: (1) basic concepts in applying the model to a real system; (2) model input requirements; (3) a detailed illustration of the application of Mobile Bay; and (4) a program listing of the hydrodynamic model. (Bell-Cornell)
W78-01544

ENVIRONMENTAL DEVELOPMENT PLAN (EDP): HYDROTHERMAL ENERGY SYSTEMS FY 1977.
Energy Research and Development Administration, Washington, DC.
For primary bibliographic entry see Field 4B.
W78-01546

DETECTION OF FILAMENTOUS IRON BACTERIA IN OPEN RECIRCULATING COOLING WATER SYSTEMS,
For primary bibliographic entry see Field 5A.
W78-01548

WORKSHOP ON NUCLEAR TECHNIQUES FOR ENVIRONMENTAL TRACE ELEMENT INFORMATION RELATIVE TO ENERGY PRODUCTION AND CONSUMPTION, FLORIDA STATE UNIVERSITY, TALLAHASSEE, JUNE 23-26, 1974.
National Science Foundation, Washington, DC.
For primary bibliographic entry see Field 5A.
W78-01550

DETERMINATION OF HARMFUL QUANTITIES AND RATES OF PENALTY FOR HAZARDOUS SUBSTANCES. VOLUME I. EXECUTIVE SUMMARY,
Battelle-Northwest, Richland, WA. Pacific Northwest Lab.
For primary bibliographic entry see Field 5A.
W78-01551

DETERMINATION OF HARMFUL QUANTITIES AND RATES OF PENALTY FOR HAZARDOUS SUBSTANCES,
Battelle-Northwest, Richland, WA. Pacific, Northwest Lab.
For primary bibliographic entry see Field 5G.
W78-01552

APPENDIX H LISTS HAZARDOUS MATERIALS BY IMCO HAZARD CATEGORY. APPENDIX I IS A DETERMINATION OF IMCO METHODOLOGY ADJUSTMENT FACTORS FOR DEGRADABILITY AND DISPERSIBILITY THROUGH THE USE OF A DELPHI TECHNIQUE. APPENDIX J PRESENTS THE DERIVATION OF REPRESENTATIVE STREAM FLOW. APPENDIX K LISTS ESTUARINE TYPES AND PRESENTS A MODEL EQUATION DERIVATION. APPENDIX L DESCRIBES DERIVATION OF THE TIME AT WHICH THE MINIMUM HARMFUL QUANTITY IS OBTAINED IN THE PLUG FLOW MODEL. APPENDIX M PRESENTS THE TOTAL COST OF PREVENTION ADJUSTMENT FACTORS. APPENDIX N LISTS FINAL HARMFUL QUANTITIES AND RATES OF PENALTY.
stment factors for the resource value methodology. Appendix D presents mathematical model determination of the total water volume subjected to a critical concentration from a point source spill of a hazardous material. Appendices E and F present IMCO/GESAMP guidelines for profiling and categorizing hazardous materials. Appendix G is a table of IMCO methodology classification of hazardous materials
For primary bibliographic entry see Field 5G.
l/chemical and toxicological data employed in nav

EXTENT OF EFFLUENT INFLUENCE ON LAKE WATER DETERMINED BY BACTERIAL POPULATION DISTRIBUTIONS,
Ontario Ministry of the Environment, Rexdale. Lab Service Branch.
D. A. Rokosh, S. S. Rao, and A. A. Jurkovic.
Journal of the Fisheries Research Board of Canada, Vol 34, No 6, p 844-849, June, 1977. 5 fig, 7 ref.

Descriptors: *Pulp wastes, *Aquatic bacteria, *Lake Superior, *Water pollution effects, Wastes, Industrial wastes, Water pollution, Water pollution sources, Lakes, Great Lakes, Coliforms, Pulp and paper industry, Effluents, Outlets, Sulfur bacteria, Population, Microorganisms, Distribution patterns, Aquatic populations, Aquatic microorganisms, Water analysis, Bioassay.
Identifiers: Kraft mills, *Nipigon Bay(Lake Superior).

Populations of heterotrophic bacteria, total and fecal coliforms, and sulfur cycle bacteria were measured in Nipigon Bay, Lake Superior, receiving the effluent from a kraft pulp and paper mill. Elevated bacterial populations were detected near the effluent outfall but persistent populations, larger than those in unaffected lake water, extended as far as 19 km from the effluent outfall. This ability to detect influences to distances up to 19 km adds a new dimension to a description of a mixing zone receiving industrial effluents. (Witt-IPC)
W78-01558

DENSITY, DISTRIBUTION, AND MOVEMENT OF NIPIGON BAY FISHES IN RELATION TO A PULP AND PAPER MILL EFFLUENT,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5C.
W78-01563

ANALYSIS OF A PULP AND PAPER MILL EFFLUENT PLUME,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 5A.
W78-01584

PERSISTENCE OF DISSOLVED ORGANIC COMPOUNDS IN KRAFT PULP AND PAPER MILL EFFLUENT PLUMES,
Canada Centre for Inland Waters, Burlington (Ontario).
M. E. Fox.
Journal of the Fisheries Research Board of Canada, Vol. 34, No. 6, p 798-804, June, 1977. 3 fig, 12 ref, 3 tab.

Descriptors: *Pulp wastes, *Organic compounds, *Effluent streams, *Water pollution, Wastes, Industrial wastes, Water pollution sources, Persistence, *Lake Superior, Pulp and paper industry, Effluents, Dispersion, Pollutants, Waste dilution, Great Lakes, Waste dilution.
Identifiers: Dehydroabietic acid, Resin acids, Kraft mills.

The persistence of dissolved organic compounds in the effluent plumes from a kraft pulp and paper mill on the north shore of Lake Superior was studied in 1974. Approximately 90 organic compounds were observed of which 36 (including all the major ones) were identified. The dispersion of five of these compounds was examined quantitatively. Dehydroabietic acid was the only major organic compound observed to exhibit measurable persistence greater than 2000 m from the effluent discharge. At 2000 m from the discharge, levels of approximately 30 micrograms/liter dehydroabietic acid were detected within the plume and approximately 15 micrograms/liter outside the effluent plume. The disappearance of dehydroabietic acid parallels that of the conservative sodium ion, in-

dicating dilution by the receiving water as the only significant shortnterm removal mechanism. (Witt-IPC)
W78-01587

NITRATE LEVELS IN ESSEX RIVER WATERS,
Essex Water Co. (England).
J. G. Slack.
Journal of the Institution of Water Engineers, Vol. 31, No. 1, p 43-53, January 1977. 7 fig, 8 tab, 4 ref, 1 append.

Descriptors: *Nitrates, *Nitrogen compounds, *Water quality, *Water analysis, *Nitrogen, Analytical techniques, Fertilizers, Leaching, Runoff, Water pollution sources, Analysis, Chemical analysis, Chemistry, Potable water, River systems, Public health, Rivers, Foreign countries, Foreign research.
Identifiers: *Essex river waters(England).

The Essex Water Company supplies an average daily quantity of water of 350 Ml, of which 250 Ml is from the rivers Blackwater, Chelmer, and Stour, either by direct intakes at Langford, Sandford Mill, and Langham, or by way of pumped storage reservoirs at Hanningfield and Abberton. The dissolved mineral content and particularly the nitrate content of the river waters is at times higher than any other river waters used in this country for major potable supplies. Levels in excess of 20 mg/l of nitrate nitrogen have been recorded at times. In February 1974 the following figures were obtained: River Chelmer 22.5, River Blackwater 20.0, River Stour 21.0, as mg/l N. This paper described the variations in the nitrate content of the river waters over the last 5 years and demonstrated the relationship between river flow and nitrate content. The influence of land drainage was described and discussed, and the effects of impounding the high nitrate waters also were documented. Measures taken by the Company to avoid high nitrate concentrations in supply were described. (Henley-ISWS)
W78-01626

QUANTITATIVE MAPPING OF SUSPENDED SOLIDS IN WASTEWATER SLUDGE PLUMES IN THE NEW YORK BIGHT APEX,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
R. W. Johnson, I. W. Duedall, R. M. Glasgow, J. R. Proni, and T. A. Nelsen.
Journal Water Pollution Control Federation, Vol. 49, No. 10, p 2063-2073, October 1977. 11 fig, 2 tab, 13 ref.

Descriptors: *Sludge disposal, *Remote sensing, *Monitoring, *New York, *Waste water disposal, Mathematical models, Analytical techniques, Mathematics, Data collections, Measurement, Water quality, Disposal, Water pollution, Oceans, Ocean circulation, Satellites(Artificial), Sludge, Suspended solids.
Identifiers: *Wastewater sludge plumes, *New York Bight, *Sludge plume mapping, Sludge plumes, Pollutant plumes, Multispectral scanner, Quantitative mapping, Spectral signatures, Remote sensing techniques, Dredge spoils.

Statistical analysis techniques were applied to develop quantitative relationships between aircraft remotely sensed data and measurements made in the plume resulting from ocean dumping of waste water in the New York Bight. A correlations coefficient of 0.96 was obtained between suspended solids in the plume and remotely sensed data from an aircraft multispectral scanner. The standard error of estimate was 4.11 mg/l over a measured range of 1.11 to 32.20 mg/l. A calibrated regression equation from the analysis was used to develop a map of quantitative distributions of suspended solids in waste water sludge dump plumes. Spectral signatures were obtained that may be useful for identification of waste water sludge plumes relative to other pollution features, such as acid waste plumes. (Henley-ISWS)
W78-01627

SHORT-TERM WATER COLUMN PERTURBATIONS CAUSED BY WASTEWATER SLUDGE DUMPING IN THE NEW YORK BIGHT APEX,
State Univ. of New York at Stony Brook. Marine Sciences Research Center.
I. W. Duedall, H. B. O'Conners, S. A. Oakley, and H. M. Stanford.
Journal Water Pollution Control Federation, Vol. 49, No. 10, p 2074-2080, October 1977. 6 fig, 1 tab, 13 ref.

Descriptors: *Sludge disposal, *Chemical properties, *New York, *Sludge, *Ocean currents, Water circulation, Analytical techniques, Hydrography, Surveys, Monitoring, Data collections, Oceanography, Ocean circulation, Sewage sludge, Wastes, Thermocline.
Identifiers: *Wastewater sludge dumping, *Water column perturbations, Ocean dumping.

Water column properties in the New York Bight apex were monitored before and after a controlled spot dump of waste water sludge. Ammonium, phosphate, and suspended solids in the discharged waste water sludge dispersion plume caused the greatest water column perturbations. Temperature, salinity, pH, and the concentrations of dissolved oxygen and chlorophyll a in the water column were not significantly affected by the waste water sludge dumping, thus suggesting, for the hydrographic and discharge conditions of the experiment, a relatively rapid descent rate for the particular wastewater sludge. By 110 minutes after dumping, the water column above the thermocline (approximately 17 m) had nearly returned to its background condition with respect to the variables measured. Below the thermocline, however, concentrations of ammonium, phosphate, and suspended solids remained high for a period greater than 2.5 hours. (Henley-ISWS)
W78-01628

RADON 222 DISTRIBUTION AND TRANSPORT ACROSS THE SEDIMENT-WATER INTERFACE IN THE HUDSON RIVER ESTUARY,
Lamont-Doherty Geological Observatory Palisades, NY.
D. E. Hammond, H. J. Simpson, and G. Mathieu.
Journal of Geophysical Research, Vol. 82, No. 27, p 3913-3920, September 20, 1977. 6 fig, 5 tab, 20 ref. EPA R-803113-01.

Descriptors: *Estuaries, *Hudson River, *New York, *Sediment-water interfaces, Tracers, Sampling, Surveys, Sediments, Spatial distribution, Profiles, Runoff, Analytical techniques, Testing, Groundwater, Surface waters, Water quality, Salinity, Interfaces, Radium radioisotopes.
Identifiers: Radon 222.

Radon 222 concentrations in waters of the Hudson River estuary show little consistent vertical, axial, or seasonal variation. The median of 106 summer measurements is 1.43 + or - 0.25 dpm/l, and the median of 17 winter measurements is 1.30 + or - 0.35 dpm/l. A budget was constructed for the water column which balances the rate of radon input against the rate of radon loss for two regions, one of which is broad and shallow and the other narrow and deep. The primary supply of radon for the two regions is from the sediments (75-90%), with minor inputs from radium 226 decay in the water column, stream runoff, and tidal pumping of groundwater. Loss of radon occurs by evasion to the atmosphere and decay in the water column in roughly equal amounts. The activity of mobile radon in sediments (per wet sediment volume) is 0.33 + or - 0.10 dpm/cu cm in the broad, shallow area of the estuary and 0.42 + or - 0.11 dpm/cu cm in the narrow, deep reach immediately upstream. When these values are used, the flux supplied by molecular diffusion is approximately 40% of the total input. Constant physical stirring of the upper few centimeters of sediments by bottom currents over large areas and stochastic reworking to somewhat greater depth in localized sediment deposits appear to be primarily responsible for augmenting the flux from sediments provided by molecular diffusion. (Humphreys-ISWS)
W78-01635

A NOTE ON HORIZONTAL GRADIENTS IN FJORDS,
Oslo Univ. (Norway). Inst. of Geophysics.
For primary bibliographic entry see Field 2L.
W78-01638

TRANSVERSE DISPERSION IN RECTANGULAR CHANNELS,
Canada Centre for Inland Waters, Burlington (Ontario).
For primary bibliographic entry see Field 8B.
W78-01639

BACTERIAL RELATIONSHIPS IN STORMWATERS,
Texas Univ. Health Science Center at Houston. School of Public Health.
E. M. Davis, D. M. Casserly, and J. D. Moore.
Water Resources Bulletin, Vol. 13, No. 5, p 895-905, October 1977. 7 fig, 2 tab, 8 ref. EPA R802433, Subgrant 733.

Descriptors: *Coliforms, *Bacteria, *Storm runoff, *Urbanization, *Water quality, Water pollution, Pathogenic bacteria, Analytical techniques, Water pollution sources, Disinfection, Storm water, Environmental engineering, Water treatment, Chlorination, Urban drainage, Urban runoff, Pollutants, Rural areas.
Identifiers: *Bacterial relationships, Bacterial pathogens, Fecal coliform, Fecal streptococci.

Data were developed within a three-year period for indicator bacteria and three species of bacterial pathogens following rural storm event hydrographs. The first flush concept was confirmed in all hydrographs. Bacterial density peaking occurred at or before the hydrograph peaks. FC and FS values were higher in more developed areas than the primary rural test site, and their numerical ratios followed similar trends. Chlorine demand of storm waters varied between 8 and 16 mg/l and, the ozone requirement was greater than 32 mg/l in the same waters. Aftergrowth of total coliform bacteria occurred following chlorine and ozone doses of 16 mg/l and 32 mg/l respectively. Fecal coliform, fecal streptococci, Salmonella sp., and Pseudomonas sp. all were reduced to near detectable limits by the disinfectants up to 8 days. Staphylococcus sp. demonstrated a propensity to reestablish their populations. Multiple regression analysis of the bacterial groups and species in storm waters suggested the fecal streptococci to have been the most useful group in evaluating bacterial storm water quality, with staphylocci having been closely related insofar as their statistical significance was concerned. (Henley-ISWS)
W78-01640

LAND USE REPORT.
Environmental Protection Agency, Denver, CO. Region VIII.
For primary bibliographic entry see Field 5G.
W78-01653

AD HOC ADVISORY PANEL ON EVALUATED PHYSICAL PROPERTY DATA IN AID OF AQUEOUS ENVIRONMENTAL PROBLEMS.
National Academy of Sciences and National Research Council, Washington, DC. Numerical Data Advisory Board.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 588, Price codes: A05 in paper copy, A01 in microfiche. Report of Meeting, August 14-15, 1975. 92 p.

Descriptors: *Path of pollutants, *Water quality, *Pollutants, *Monitoring, Organic compounds, Inorganic compounds, Chemical reactions, Anions, Cations, Metals, Pesticides, Herbicides, Chemical properties, Physical properties, Radioactive wastes, Effluents, Water pollution, Environment.

An NAS-NRC Panel discussed needs for evaluated physical and chemical property data of importance for environmental monitoring and effluent control, for the study of the fate of pollutants, and for the establishment of meaningful standards. Systems include both organic and inorganic pollutants in solution and in the presence of particulate matter; properties include analytical, equilibrium, and surface properties. Seven presentations to the panel were included, along with a summary of recommendations. (Sims-ISWS)
W78-01654

DIPHENYL ETHER - ANOTHER MARINE ENVIRONMENTAL CONTAMINANT,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Marine Ecology Lab.
For primary bibliographic entry see Field 5A.
W78-01668

TOTAL AND ORGANIC MERCURY IN THE PACIFIC BLUE MARLIN,
Hawaii Univ., Honolulu. Dept. of Agricultural Biochemistry.
For primary bibliographic entry see Field 5A.
W78-01673

CONCENTRATION OF CADMIUM, COPPER, LEAD AND ZINC IN SIX SPECIES OF FRESHWATER CLAMS,
Northern Illinois Univ., DeKalb. Dept. of Biological Sciences.
R. V. Anderson.
Bulletin of Environmental Contamination and Toxicology, Vol 18, No 4, p 492-496, 1977. 1 fig, 1 tab, 12 ref.

Descriptors: Animal physiology, *Animal metabolism, *Clams, *Zinc, *Lead, *Cadmium, *Copper, *Absorption, *Adsorption, *Membrane processes, *Heavy metals, *Mollusks, Sediments, Metals, Shellfish, Path of pollutants.
Identifiers: Tissue analysis, Bioaccumulation, Gills.

The metal (Cd, Cu, Pb, Zn) concentrations in the bodies of the freshwater clams studied generally reflected that found in the environment, with the exception of Zn. The shell had comparatively lower concentrations of all metals which reflects its inactive role in filtering and feeding. While concentrations of the metals are not the same between salt water and freshwater clams, the relationships between the metals, body parts, and environment were similar. (Katz)
W78-01675

EFFICIENT ALGORITHMS FOR STATISTICAL ESTIMATION IN COMPARTMENTAL ANALYSIS: MODELLING 60CO KINETICS IN AN AQUATIC MICROCOSM,
Georgia Univ., Athens. Dept. of Statistics and Computer Science.
R. E. Bargmann, and E. Halfon.
Ecological Modelling, Vol 3, p 211-226, 1977. 1 fig, 3 tab, 21 ref.

Descriptors: *Mathematical models, Mathematical studies, *Radioisotopes, *Cobalt radioisotopes, *Tracking techniques, *Kinetics, *Algorithsm, Aquatic environment, Ecosystems, *Regression analysis, Aquaria, *Methodology.
Identifiers: *Linear ecosystem models.

A mathematical model of radionucleide kinetics in a laboratory microcosm was built by systems identification techniques. Insight into the functioning of the system was obtained from analysis of the model. Methods employed have allowed movements of radioisotopes not directly observable in the experimental system to be distinguished. Results are generalized to whole ecosystems. (Katz)
W78-01676

THE SPECIES DIVERSITY INDEX OF SOME IN-SHORE DIATOM COMMUNITIES AND ITS USE IN ASSESSING THE DEGREE OF POLLUTION ON PARTS OF THE NORTH COAST OF COMWALL,
N. I. Hendey.
In: Fourth Symposium on Recent and Fossil Marine Diatoms, Oslo, Aug 30-Sept 3, 1976, Proceedings R. Simonsen, ed., p 354-377. 2 fig, 2 tab, 25 ref. J. Kramer, Vaduz, 1977.

Descriptors: *Diatoms, *Bioindicators, Biological communities, Population, *Seasonal, Mathematical studies, *Epiphytology, *Biomass, *Coasts, Water pollution effects, Analytical techniques, Domestic wastes.
Identifiers: Species diversity index, *Cornwall(England).

The Species Diversity Index of a community indicates the degree of 'pollution insult' imposed upon the community by the environment. When the indices of six diatom communities collected from the north coast of Cornwall were ranked in a decreasing order, it was found that three of the sites enjoyed values higher than average while the others were lower. The values decreased during the summer (indicating worsening environmental conditions), the time of year when the population of the County rises steeply due to the influx of summer visitors. (Katz)
W78-01678

TOXICITY OF N-PHENYL-A-NAPHTHYLAMINE AND HYDRAZINE TO XENOPUS LAEVIS EMBRYOS AND LARVAE,
California Univ., Irvine. Dept. of Anatomy; and California Univ., Irvine. Dept. of Developmental and Cell Biology.
For primary bibliographic entry see Field 5C.
W78-01680

BEHAVIOR OF MERCURY IN BIOSYSTEMS I. UPTAKE AND CONCENTRATION IN FOOD-CHAIN,
Georgia Univ., Athens. Dept. of Food Science.
N. V. Prabhu, and M. K. Hamdy.
Bulletin of Environmental Contamination and Toxicology, Vol. 18, No. 4, p. 409-417, 1977. 2 fig, 2 tab, 27 ref.

Descriptors: *Mercury, *Heavy metals, *Food chains, Food pyramids, *Bacteria, Fish physiology, *Larvel growth stage, *Mosquitos, *Tracers, *Radioisotopes, *Trophic level, *Water temperature, *Absorption, *Membrane processes, *Animal metabolism, Metabolism, Tissue analysis, Bioaccumulation, Lebistes, Bacillus, Biotransformation, Gills.

This study was conducted to measure the rate of uptake of two mercurial compounds in a simple model food-chain consisting of three trophic levels (bacteria, larvae and fish) and to ascertain the mercury-concentration factor in each. Data were presented on the effects of exposure time, temperature, and form of radioactively-labeled mercury on uptake and concentration factor. (Katz)
W78-01682

MERCURY IN FISH AND SHELLFISH OF THE NORTHEAST PACIFIC. III. SPINY DOGFISH, SQUALUS ACANTHLAS,
National Marine Fisheries Service, Seattle, WA. Northwest and Alaska Fisheries Center.
A. S. Hall, F. M. Teeny, and E. J. Gauglitz, Jr.
Fishery Bulletin, Vol. 75, No. 3, p. 642-645, 1977. 2 fig, 2 tab, 10 ref.

Descriptors: *Mercury, *Heavy metals, *Commercial fish, *Marine fish, Commercial fishing, Size, *Path of pollutants, Fish physiology, *Standards, Public health, Water pollution sources, Chemical analysis, Tissue analysis, Bioaccumulation, *Dogfish, Squalus, *Puget Sound(Wash).

In response to a growing foreign market for dogfish, investigations were undertaken to determine the tissue mercury levels in relation to import regulations of various countries. Mean mercury levels in specimens from six sampling areas in Puget Sound were at or above the action level of 0.50 ppm set by the U.S. FDA. In addition, a significant relationship was noted between body weight and total mercury content. (See also W77-05865) (Katz)
W78-01683

APPARATUS AND PROCESS FOR DRAWING WATER FROM A WATER-BEARING STRATA,
Thyssen Plastik Anger K.G., Munich (West Germany).
For primary bibliographic entry see Field 4B.
W78-01695

5C. Effects Of Pollution

ALGOLOGIC AND CHEMICAL-BACTERIOLOGIC STUDY OF THE WATER OF THE RESERVOIR OF THE PUBLIC PROMENADE OF CURITIBA, STATE OF PARANA, BRAZIL: I. GENERA OF MICROSCOPIC ALGAE (IN PORTUGUESE),
Universidade Federal de Pernambuco, Recife (Brazil). Inst. of Biological Sciences.
I. I. Trippa-Cecy, I. M. V. Moreira, and E. Hohmann.
Bol Mus Bot Munic (Curitiba) 25. 1-37. 1976. (English summary).

Descriptors: *Algae, *Artificial lakes, Chlorophyta, Chrysophyta, Cyanophyta, Euglenophyta, *Pollutant identification, Brazil.

The distribution of microscopic algae in an artificial lake in Curitiba, Parana, Brazil was studied. Of the 54 genera detected, 75% were Chlorophyta, 15% Chrysophyta, 5% Cyanophyta and 5% Euglenophyta. The pollution indicator algae Scenedesmus, Euglena, Gomphonema and Microcystis prevailed in Nov. and Dec. of 1973 and March-Oct. of 1974, indicating the occurrence of pollution for almost the entire year. Chemical and bacteriological tests confirmed the psycological results.--Copyright 1977 Biological Abstracts, Inc.
W78-01198

IMPORTANCE OF HOMOLOGY IN HYGIENIC STANDARDIZATION OF INDUSTRIAL CONTAMINATION OF WATER BODIES (IN RUSSIAN),
For primary bibliographic entry see Field 5B.
W78-01199

HYGIENIC PROBLEMS OF PROTECTING WATER RESERVOIRS FROM POLLUTION WITH THERMAL ELECTRIC POWER PLANTS (IN RUSSIAN),
Yu. V. Novikov, L. V. Kudrin, and N. P. Pushkina.
Gig Sanit 9. 84-88. 1976.

Descriptors: *Potable water, *Heated effluent, Reservoirs, *Thermal power plant, Industrial wastes.

Environmental pollution (water reservoirs for human drinking water, air soil) with warm water

from thermal electric power plants and related industrial sewage with different chemical and physical composition is discussed. Necessity to develop purification and utilization methods for the sewage and to establish hygienic recommendations for locating thermal electric power plants on water reservoirs used as drinking water sources is indicated.--Copyright 1977 Biological Abstracts, Inc.
W78-01200

RECOMMENDATIONS FOR MICROBIOLOGICAL STUDIES IN THE CONTINENTAL SHELF AREAS. RESULTS FROM TWO WORKSHOPS CONVENED 10-11 AUGUST 1976 AND 19-20 OCTOBER 1976 IN BOULDER, COLORADO. OUTER CONTINENTAL SHELF ENVIRONMENTAL ASSESSMENT PROGRAM.
National Oceanic and Atmospheric Administration, Boulder, CO. Marine Ecosystems Analysis Program.
Technical Memorandum ERL MESA-16, October 1977. 50 p.

Descriptors: *Microbial degradation, Resources development, *Baseline studies, *Water pollution, *Environmental effects, *Oil spills, Microorganisms, Biomass, Continental Shelf, Alaska, Organic compounds.
Identifiers: *Outer Continental Shelf.

During the preparation of a five-year plan for Bureau of Land Management-supported studies, to be conducted in the Alaskan Outer Continental Shelf (OCS) before oil and gas development, workshop participants were asked to draw up and provide techniques for the following studies: general characterization of the existing microbial populations; the effect of human activities on natural microbiological communities and their functioning; the effect of natural microbial communities on OCS activities; and requirements for supporting data and information on related processes. Temperature, salinity and inorganic nutrient data are some of the parameters considered. This report contains a detailed listing of microbiological studies that the group agreed should be included in marine assessment programs. It also contains a section explaining the necessary sampling procedures and requirements, in order to standardize these techniques. (NOAA)
W78-01274

FIELD STUDIES ON BENTHIC COMMUNITIES IN THE NEW ENGLAND OFFSHORE MINING ENVIRONMENTAL STUDY (NOMES),
New Hampshire Univ., Durham.
L. G. Harris.
Final Report to NOAA, Environmental Research Laboratories, 1977. 135 p, 4 fig, 16 tab, 76 ref.

Descriptors: *Environmental effects, *Sands, *Gravels, *Mining, *Benthic fauna, *Benthic flora, *Resources development, Dredging, Bioindicators, Water pollution, *New England.
Identifiers: Ocean mining, Outer Continental Shelf, Indicator species.

The purpose of the benthic communities study, within the multi-disciplinary, multi-institutional New England Offshore Mining Environmental Study (NOMES), was to describe the environmental effects of sand and gravel mining and to develop criteria for predicting the potential impact of future mining operations in the sea. Results are summarized of field studies conducted during 1972 and 1973. In line with the original goals of the NOMES Project, identification of indicator species, an evaluation of procedures used and recommendations for conducting future environmental impact studies related to marine mining are included. (NOAA)
W78-01275

REVIEW OF EXISTING INFORMATION ON FISHES IN THE DEEP OCEAN MINING ENVIRONMENTAL STUDY (DOMES) AREA OF THE TROPICAL PACIFIC,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
M. Blackburn.
Report to NOAA, Environmental Research Laboratories, IMR Ref. 76-1, January 1976. 79 p, 11 fig, 5 tab, 139 ref. 04-4-022-6.

Descriptors: *Turbidity, *Water pollution effects, Resources development, *Mining, *Environmental effects, *Baseline studies, Bioindicators, Plankton, Fisheries, Sediments.
Identifiers: *Ocean mining, Nodules, Tropical Pacific Ocean, Manganese nodules.

The Deep Ocean Mining Environmental Study (DOMES) development plan gives an idea of the ways in which the so-called mining operations will affect the marine environment. The bottom will be scraped and a mixture of nodules, sediment and water taken up the water column to the sea surface, either hydraulically or mechanically. If a hydraulic system is used the bottom will be disturbed and a turbidity plume created just above it. In addition bottom water will be discharged at the sea surface, creating another turbidity plume as in sinks. If a mechanical (continuous line bucket) system is used the bottom will be disturbed and there will be a continuous rain of fine particles down most of the water column, especially the lower part. These changes could locally affect fish, indirectly by altering the kind or amount of food available to them, or directly by altering their physical environment. The alteration to the food supply might be significant or insignificant, adverse of favorable. The alteration to the physical environment would probably be significant and adverse. (NOAA)
W78-01276

PHYTOPLANKTON AND PRIMARY PRODUCTIVITY STUDIES; PRELIMINARY REPORT,
Texas A and M Univ., College Station. Dept. of Oceanography.
S. Z. El-Sayed, S. Taguchi, G. Fryxell, and K. Buck.
NOAA, Environmental Research Laboratories, Deep Ocean Mining Environmental Study (DOMES), Unpublished Manuscript No. 2, May 1976. 50 p, 19 fig, 10 tab, 10 ref.

Descriptors: *Phytoplankton, *Primary productivity, *Baseline studies, Resources development, *Environmental effects, Pigments, Standing crops, Seasonal.
Identifiers: *Outer Continental Shelf, Ocean mining, Seasonal changes.

Data from the phytoplankton studies obtained during RP-8-OC-75, Legs I and II, and leg IV of RP-8-OC-76 are presented, summarized, and discussed. The first objective was to provide the baseline information on the phytoplankton community which will be necessary to evaluate post mining populations to determine what, if any, effects mining has on them. The parameters of standing crop and primary production are used to define the baseline population. The physiological state and efficiency of the organisms, determined from pigment ratios, cell counts and assimilation ratios as well as the depth of the pigment and primary production maxima, the amount of standing crop and production below the 1% light level and the presence or absence of seasonal changes in standing crop and primary production are all factors which are used to characterize this pre-mining population. The second objective is to predict in advance what effects mining will have upon the phytoplankton of the DOMES region. Enrichment experiments will be the basis for these predictions. (NOAA)
W78-01278

EUTROPHICATION: A THREAT TO NEW HAMPSHIRE'S LAKES AND PONDS - WHAT LEGAL TOOLS ARE AVAILABLE FOR PROTECTION,
Southern Rockingham Regional Planning District Commission, Salem, NH.
For primary bibliographic entry see Field 5G.
W78-01359

SEWAGE SLUDGE ANSWERS ARE STILL NEEDED.
Farm Chemicals, Vol 140, No 6, p 40, 42, June, 1977.

Descriptors: *Fertilizers, *Heavy metals, *Agricultural practices, *Nutrient removal, *Trace elements, Crops, Cadmium, Copper, Molybdenum, Zinc, Lead, Mercury, Chromium, Nitrogen, Phosphorus, Sludge disposal, Waste water disposal, Environmental effects, Path of pollutants, Bioassay, Absorption.

Various aspects related to the environmental effects of the application of sewage sludge to cropland are discussed. Although only 1% of the total 1970 cropland would be required for disposal of all of the sludge produced annually in the United States, one of the problems associated with land application as a means of sludge disposal is that the highest quantities of sludge are produced in highly populated areas where the amount of land available for agricultural purposes is limited. Studies on the long-term environmental impact of sludge application have indicated that the uptake of metals in sludges by plants is greater during the initial application than during subsequent periods. Criteria for the feasibility of land application programs are based on the nitrogen, phosphorus, and heavy metal contents of the sludges. Various studies on the uptake by plants and adverse effects of heavy metals are discussed. Elements which are considered to pose relatively little hazard to crop production incluude Mn, Fe, Al, Cr, As, Se, Sb, Pb, and Hg. Elements which are discussed as posing hazards under certain conditions include Cd, Cu, Mo, Ni, and Zn. (Schulz-FIRL)
W78-01449

EXPERIENCES WITH THE ALGAL ASSAY PROCEDURE (ERFAHRUNGEN MIT DER ALGAL ASSAY PROCEDURE),
Hoechst A.G., Frankfurt am Main (West Germany). Pflazenschutzforschung-Biologie.
For primary bibliographic entry see Field 5A.
W78-01478

APPLICATION OF SEWAGE SLUDGE TO CROPLAND: APPRAISAL OF POTENTIAL HAZARDS OF THE HEAVY METALS TO PLANTS AND ANIMALS.
Council for Agricultural Science and Technology, Ames, IA.
Available from GSA, Centralized Mailing List Services, Bldg. 41, Denver, Colo. 80225, as MCD-33. Report EPA 430/9-76-013, 1976. 69 p, 23 tab, 87 ref, 1 append.

Descriptors: *Heavy metals, *Return flow, *Environmental effects, *Fertilizers, *Land management, Land reclamation, Toxicity, Soil contamination effects, Food chain, Lethal limit, Crop response, Nutrient requirements, Nitrogen, Phosphorus, Manganese, Iron, Aluminum, Chromium, Selenium, Antimony, Lead, Mercury, Cadmium, Copper, Molybdenum, Nickel, Zinc.

A state-of-the-art survey on the potential effects of heavy metals in land-applied sewage sludges on agricultural crops, animals, and groundwater is presented. Quantitative and qualitative data are given for sludge production, cropland requirements, and the metal content of crops. Limiting factors on the application of municipal sludges to cropland are examined, including the rate of application, nitrogen content, heavy metal concentrations, phosphorus, boron, and soluble salts. Accessory criteria are described, including soil pro-

perties, reclamation of disturbed lands, groundwater protection, surface water protection, crop selection, and monitoring needs. Aspects of monitoring which are considered include sampling methods, sample preservation, and analytical procedures. Heavy metals and other elements which may be present in sewage sludge but do not pose a significant hazard to plants and animals are examined, including: manganese, iron, aluminum, chromium, arsenic, selenic, antimony, lead, and mercury. Elements which pose a potentially serious hazard because of their toxicities or concentrations include cadmium, copper, molybdenum, nickel, and zinc. (Schulz-FIRL)
W78-01513

CHEMICAL/BIOLOGICAL IMPLICATIONS OF USING CHLORINE AND OZONE FOR DISINFECTION,
Minnesota Univ., Duluth. Dept. of Chemistry.
R. M. Carlson, and R. Caple.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-270 694, Price codes: A05 in paper copy, A01 in microfiche. Report EPA-600/3-77-066, June 1977. 88 p, 7 fig, 17 tab, 151 ref, 2 append.

Descriptors: *Disinfection, *Chlorination, *Ozone, *Environmental effects, *Chemical reactions, Toxicity, Biochemical oxygen demand, Daphnia, Aquatic life, Organic compounds, Phenols, Waste water treatment, Bioassay, Chemical analysis, Analytical techniques.
Identifiers: Daphnia magna, Anilines, Benzoic acid, Chlorination byproducts.

Chemical and biological studies were conducted to determine the fate, distribution, speciation, and effects of chlorine, ozone and associated byproducts in waste water disinfection. The product distribution and individual components were examined for chlorinated or ozonated waste water containing the following: aromatics, alphaterpineol, oleic acid, fatty acids, resin acids, cholesterol, and phenols. The toxicological effects of disinfection byproducts were examined for Daphnia magna. Hansch 'structure-activity' relationships are suggested as useful in predicting phenol toxicities. The observed toxicity of phenols to Daphnia magna was attributed to the compound's lipiphilic nature. A method for determining the partition coefficient with a 'reverse-phase' high liquid chromatography column was devised to predict the effects of a compound on the environment. Laboratory studies were conducted to determine the effect of chlorination on the biochemical oxygen demand of effluents containing phenols, benzoic acid, and anilines. Lower BOD values and higher toxicities were associated with chlorination byproducts than with parent compounds. (Schulz-FIRL)
W78-01517

PLANKTONIC CENTRIC DIATOMS OF THE SANDUSKY RIVER NEAR FREMONT, OHIO,
Bowling Green State Univ., OH. Dept. of Biological Sciences.
R. L. Lowe, and P. A. Kline.
In: Proceedings of Sandusky River Basin Symposium, Held at Tiffin, Ohio on May 2-3, 1975. p. 144-152. 2 fig, 6 ref.

Descriptors: *Plankton, *Algae, *Diatoms, *Phytoplankton, *River basins, Standing crops, Data collections, Aquatic algae, Aquatic plants, Ohio, Rivers, Census, Classification.
Identifiers: *Sandusky River(Ohio), *Centric diatoms.

Species variety and absolute abundances, of centric diatoms, often the most abundant river phytoplankton, were established for the Sandusky River in Ohio at a point 10 km upstream from Sandusky Bay. Collections were made between October 1973 and May 1974. Phytoplankton were concentrated 10 to 50 fold, and analyzed for standing crop. Twelve taxa were observed: Cyclotella atomus, C. meneghiniana, C. pseudostelligera, C. stelligera, Melosira granulata, M. varians, Microsiphona potamos, Stephanodiscus astraea var. minutula, S. hantzschii, S. invisitatus, Thalassiosira fluviatilis, and T. pseudonana. Cyclotella atomus was the most abundant fall species, with over 41,000 cells/ml. Stephanodiscus invisitatus dominated the spring samples with over 49,000 cells/ml. All species of Cyclotella except C. pseudostelligera, which was numerically insignificant, were more abundant in fall than in spring. All Stephanodiscus species reached a maximum in spring. Microsiphona potamos was important numerically in the spring. (See also W78-01515) (Lynch-Wisconsin)
W78-01523

SEASONAL DISTRIBUTION OF PERIPHYTIC DIATOMS COMMUNITIES OF TYMOCHTEE CREEK,
Bowling Green State Univ., OH. Dept. of Biological Sciences.
P. A. Pryfogle.
In: Proceedings of Sandusky River Basin Symposium, Held at Tiffin, Ohio on May 2-3, 1975. p. 153-173. 2 fig, 3 tab, 9 ref.

Descriptors: *Algae, *Diatoms, *Seasonal, *Periphyton, *River basins, Ohio, Streams, Aquatic algae, Aquatic plants, Ecology, Ecological distribution.
Identifiers: *Sandusky River Basin(Ohio), *Tymochtee Creek(Ohio), *Autecology, *Periphytic diatoms.

Periphytic diatoms were collected seasonally for a year in Tymochtee Creek, a major tributary of the Sandusky River in Ohio. All diatoms were identified as to species and noted whether living or dead by means of staining with acid fuschin. Seventy species were identified and nine additional unidentified specimens were collected. Autecological information was compiled by comparison with previous research. A table is included giving seasonal data on abundance. The study concludes that sufficient information about diatom autecology is present to warrant their use as water quality indicator organisms. When put to this use it is important to distinguish between live and dead cells. In the summer collection, of 710 cells counted, 69% were alive. In summer the figure was 52% of 754.5 cells, in fall 65% of 502.5 cells, and in winter 87% of 550 cells counted. (See also W78-01515) (Lynch-Wisconsin)
W78-01524

PHYTOPLANKTON OF THE SANDUSKY RIVER NEAR FREMONT, OHIO,
Bowling Green State Univ., OH. Dept. of Biological Sciences.
P. A. Kline, and R. L. Lowe.
In: Proceedings of Sandusky River Basin Symposium, Held at Tiffin, Ohio on May 2-3, 1975. p 176-208. 3 fig, 1 tab, 21 ref, 1 append.

Descriptors: *Phytoplankton, *Aquatic plants, *Algae, *Diatoms, *Plankton, *River basins, Rivers, Ohio, Seasonal, Spatial distribution, Water temperature, Turbidity, Standing crops, Discharge(Water), Data collections, Monitoring, Ecology.
Identifiers: *Sandusky River(Ohio).

Taxonomic, seasonal, spatial, and ecological data on phytoplankton are given for a 12-km segment of the Sandusky River near Fremont, Ohio. Four sampling sites were monitored October 1973-May 1974. Results are also given for alkalinity, hardness, nitrate nitrogen, nitrite nitrogen orthophosphate, silica, transparency, and turbidity. Of the 265 algal taxa identified, diatoms were dominant, comprising 78-93% of the phytoplankton (206 species). Forty-three taxa of green algae were identified (5.1-16.4%). Other specimens included chrysophytes (2 taxa), blue-green algae (8 taxa), euglenoids (4 taxa), and dinoflagellates (2 taxa). There was a strong relationship between mean stream temperature and standing crop values. Lowest values were recorded between December and April when temperatures were low and stream discharge high. Autumn and spring maxima were observed during periods of low river discharge and water temperature. Spatial variations among the four sites were not significant. The expected response of the phytoplankton to higher nutrient levels below the effluent of the city was absent. A complete taxonomic inventory is included. (See also W78-01518) (Lynch-Wisconsin)
W78-01525

A COMPARISON OF THE WINTER DIATOM FLORA OF THE SANDUSKY RIVER AND TYMOCHTEE CREEK,
Bowling Green State Univ., OH. Dept. of Biological Sciences.
R. J. Stevenson, and P. A. Pryfogle.
In: Proceedings of Sandusky River Basin Symposium, Held at Tiffin, Ohio on May 2-3, 1975. p 209-231. 4 fig, 3 tab, 18 ref.

Descriptors: *Diatoms, *Algae, *Aquatic plants, *Periphyton, *River basins, Rivers, Streams, Tributaries, Ohio, Data collections, Effluents.
Identifiers: *Sandusky River(Ohio), *Tymochtee Creek(Ohio), *Epilithic diatoms.

Epilithic diatoms were collected in the Sandusky River of Ohio and a major tributary, Tymochtee Creek, and analyzed for species composition, abundance, diversity, and community similarities. Ten stations on the Sandusky River and four stations on Tymochtee Creek were sampled in February-March, of 1975. Simpson's similarity index was calculated for each possible combination of any two of the 14 stations. Of 89 taxa representing 21 genera identified, 40 taxa were found to be common to both streams. Twenty-one were found only in the Sandusky River and 28 only in Tymochtee Creek. Nitzschia dissipata was the most abundant diatom observed, and comprised 93% of the community at one station on the Sandusky River. Ten other taxa were classified as abundant (20% of one or more stations): Achnanthes haukiana, Gomphonema olivaceum, Navicula radiosa var. tenella, N. secreta var. apiculata, N. tantula, N. tripunctata, N. viridula, Nitzschia frustulum var. perpusilla, Rhoicosphenia curvata, Surirella ovata var. ovata. Speciation was generally more diverse in Tymochtee Creek than in the Sandusky River, possibly because high water scoured the epilithic communities between the Sandusky sampling on February 15 and the Tymochtee sampling on March 6. Recolonization generally is accompanied by greater species diversity. Distinct distributional differences were noted among the Tymochtee Creek stations, among the Sandusky River stations, or between the Tymochtee Creek stations and the Sandusky River stations. (See also W78-01518) (Lynch-Wisconsin)
W78-01526

THE FISHES OF THE SANDUSKY RIVER SYSTEM, OHIO,
Ohio State Univ., Columbus.
M. B. Trautman.
In: Proceedings of Sandusky River Basin Symposium, Held at Tiffin, Ohio on May 2-3, 1975. p 233-241. 6 ref.

Descriptors: *Fish, *Turbidity, *River basins, Rivers, Tributaries, Lake Erie, History, Ohio.
Identifiers: *Sandusky River System(Ohio).

Before 1850 erosion in the Sandusky River Basin in Ohio was minimal because soils were largely held in place by swamp forests and prairies. Decomposing vegetation on the great swamps furnished both food and cover for several fish species. Waters apparently were rarely turbid, and many species intolerant to turbidity were present.

Early Ohio literature often refers to a great abundance of fish in Lake Erie and its tributaries. Many fish species migrated into and spawned in the Sandusky River before the advent of dams, extensive drainage, increased turbidity, and pollutants. Sturgeon, walleye, and muskellunge, formerly of economic importance, are nearing extirpation today. Rockfish, white bass, catfish, pike, and pickerel were also abundant. Since 1850, 88 species of fish have been recorded. Of these, 41 species show little evidence of a decrease in numbers; most are tolerant to pollutants and silt turbidity. Thirty-five species have decreased in abundance, none of which have not been recorded since 1940. Dams prevented upstream migration of some species, ditching and draining destroyed spawning habitats, and decrease of aquatic vegetation and increased turbidity caused the decline of some fish. Six of the remaining 12 species appear to be recent invaders, including the sea lamprey, suckermouth minnow, and orangespotted sunfish. Carp and goldfish are now very numerous. (See also W78-01518) (Lynch-Wisconsin)
W78-01527

SANDUSKY RIVER BORDERS AND RESERVOIRS AS MIGRATORY BIRD REFUGES,
Heidelberg Coll., Tiffin, OH.
For primary bibliographic entry see Field 6G.
W78-01528

THE AQUATIC COLEOPTERA OF THE SANDUSKY RIVER, OHIO,
Bowling Green State Univ., OH. Environmental Studies Center.
B. L. Prater, H. P. Brown, and W. D. Shephard.
In: Proceedings of Sandusky River Basin Symposium, Held at Tiffin, Ohio on May 2-3, 1975. p 255-276. 4 fig, 12 tab, 8 ref.

Descriptors: *Insects, *Aquatic insects, *River basins, Data collections, Standing crops, Ohio, Rivers, Census, Seasonal.
Identifiers: *Sandusky River(Ohio), *Coleoptera, *Aquatic coleoptera, Elmidae, Psephenidae.

Samples of families and 18 species of aquatic coleoptera were collected, as part of a much larger survey of all the benthic macroinvertes of the Sandusky River in Ohio. Some species that might be expected to occur were absent from the results, due to sampling techniques not specifically geared to aquatic coleoptera. Riffle, pool and marginal samples were combined at each of 10 stations for 12 months in 1973-74. Stenelmis was relatively most abundant with 31.6%; Psephenus herricki was next with 22.1%. The largest standing crop of coleoptera (421/sq m) was recorded in August, 1974. The greatest number of different species at one station was nine; the least was zero. The family Elmidae contained the greatest number of species collected. Elmids seem to have at least five instars, and pupate under stones or in wood in water. They over-winter in all stages. Only 10 Psephenidae were collected. Aquatic coleoptera should be considered as water quality indicators; elmid and dryopoid beetles, for example, are virtually eliminated by soapy water. Extensive tables with study results are presented. (See also W78-01518) (Lynch-Wisconsin)
W78-01529

THE ECOLOGY OF RUNNING WATERS: THEORY AND PRACTICE,
Michigan State Univ., Hickory Corners. W. K. Kellogg Biological Station.
For primary bibliographic entry see Field 6G.
W78-01530

BENTHIC MICROINVERTEBRATE POPULATIONS OF SANDUSKY BAY,
Ohio State Univ., Put-in-Bay. Center for Lake Erie Area Research.
C. E. Herdendorf, and W. K. Lindsay.
In: Proceedings of Sandusky River Basin Symposium, Held at Tiffin, Ohio on May 2-3, 1975. p 359-377. 2 fig, 3 tab, 7 ref.

Descriptors: *Invertebrates, *Benthic fauna, *Insects, *Oligochaetes, *Diptera, *River basins, Seasonal, Data collections, Annelids, Sludge worms, Midges, Aquatic populations, Environmental effects, Eutrophication, Bays, Ohio.
Identifiers: *Sandusky Bay(Ohio), *Sandusky River Basin(Ohio).

A study of the benthic macroinvertebrate community of Sandusky Bay and tributaries, largely composed of oligochaete worms and chironomid (midge) larvae, was undertaken in part to determine the environmental suitability of a tract of land on the bay for an electric generating plant. Forty-three stations were sampled from November 1972 to October 1974. Six species comprised 90% of the fauna; there were three oligochaetes (Branchiura sowerbyi, Limnodrelus hoffmeisteri, and Peloscolex ferox) and three dipterans (Chironomus c. plumosus, Procladius bellis, and Coelotanypus scapularis). Thirty-one genera were recorded from about 300 samples. The highest mean number of organisms at one station was 3,374/sq m, with a monthly high of 17, 673/sq m in March 1973. That station was the most sheltered and therefore probably the most stable habitat. At all stations the largest number of organisms was collected in March 1973, 4,485/sq mi, followed by a monthly decline to a low in August 1973. Subsequent monthly increases lasted again until March (1974); decline persisted through October 1974. The low density in July and August is probably due to the emergence of chironomids and the natural mortality of oligochaetes. Highest density was in mid-bay, and lowest near the shore. The data show no correlation between the density of one species against another, and little evidence of geographic preference by species. Both oligochaetes and chironomids prefer highly eutrophic conditions, such as the highly organic mud and silt substrates of Sandusky Bay. (See also W78-01518) (Lynch-Wisconsin)
W78-01531

ABUNDANCE AND POPULATION TRENDS OF SANDUSKY BAY FISHES,
Ohio State Univ., Put-in-Bay. Center for Lake Erie Area Research.
S. M. Hartley, and C. E. Herdendorf.
In: Proceedings of Sandusky River Basin Symposium, Held at Tiffin, Ohio on May 2-3, 1975. p 380-422. 16 fig, 8 tab, 15 ref.

Descriptors: *Fish, *Lake Erie, *River basins, Freshwater fish, Bays, Environmental effects, Fish populations, Ohio, Seasonal, Aquatic populations, Data collections, Food chains.
Identifiers: *Sandusky Bay(Ohio), *Sandusky River Basin(Ohio).

Twenty-three species of fish in 13 families were collected at 32 sampling sites on Sandusky Bay in Lake Erie from November 1972 to November 1974 as part of an environmental assessment conducted in connection with a proposed nuclear power plant on the bay. Gizzard shad (Dorosoma cepedianum) and yellow perch (Perca flavescens) dominate the population (40% and 22%). Other significant species are: white bass (Morone chrysops) 8.4%, carp (Cyprinus carpio) 7.4%, goldfish (Carassius auratus) 7.4%, white crappie (Pomoxis annularis) 6.2%, brown bullhead (Ictalurus nebulosus) 6.0%, freshwater drum (Aplodinotus grunniens) 4.2%, channel catfish (Ictalurus punctatus) 1.2%, and walleye (Stizostedion v. vitreum) 1.0%. Rough and nongame fish make up 63.0% of the species collected, game fish 35.8%, and forage fish 1.2%. The smallest mesh size of the gear used to collect fish was one-half inch. This tended to eliminate the forage base from the samples. The bluntnose minnow, spotfin shiner, spottail shiner, and emerald shiner are presumed present and abundant. In total fish population, August was the peak month for 1973 and 1974, followed by April-May 1974. Several species were analyzed for stomach content. Diptera, and fish, Oligochaetes and Deatoms are the major food items of most species. Environmental stress in the last 150 years has caused the decline of many species, including white bass (once the most abundant species), walleye, northern pike, and muskellunge. Currently abundant species have either stable or increasing populations. (See also W78-01518) (Lynch-Wisconsin)
W78-01532

SOME BRIEF REFLECTIONS ON THE SYMPOSIUM, THESE PROCEEDINGS AND WATER QUALITY STUDIES IN THE SANDUSKY RIVER BASIN,
Heidelberg Coll., Tiffin, OH.
For primary bibliographic entry see Field 5B.
W78-01534

DETERMINATION OF HARMFUL QUANTITIES AND RATES OF PENALTY FOR HAZARDOUS SUBSTANCES. VOLUME I. EXECUTIVE SUMMARY,
Battelle-Northwest, Richland, WA. Pacific Northwest Lab.
For primary bibliographic entry see Field 5A.
W78-01551

EFFECT OF PULP MILL EFFLUENT ON SURFICIAL SEDIMENTS OF WESTERN NIPIGON BAY, LAKE SUPERIOR,
Canada Centre for Inland Waters, Burlington (Ontario).
R. G. Sandilands.
Journal of the Fisheries Research Board of Canada, Vol. 34, No. 6, p 817-823, June, 1977. 5 fig, 24 ref, 2 tab.

Descriptors: *Pulp wastes, *Lake sediments, *Lake Superior, *Water pollution, Lakes, Wastes, Industrial wastes, Water pollution sources, Effluents, Pulp and paper industry, Hydrogen ion concentration, Organic matter, Sediments, Bottom sediments, Sulfur, Mercury, Foreign countries, Canada.
Identifiers: Kraft mills, *Nipigon Bay(Lake Superior).

Bottom sediment samples were obtained in June 1974 to determine the zone of influence of a point source discharge from the kraft paper mill at Red Rock, Ontario. The composition of the samples were described by particle-size distribution, organic and inorganic carbon, major elements and trace element analyses. Correlation coefficients and cluster analysis were used to determine any characteristic association. The results showed that the mill discharge decreased pH and increased organic matter in the sediment. Above average concentrations of total sulfur and mercury appeared to be associated with this organic matter. These effects were localized around the point source (1.5 km) and were detectable to about 5 km downstream from the mill outfall. (Witt-IPC)
W78-01554

ADAPTIVE REACTIONS OF CARP TO CHANGES IN CONCENTRATION OF FREE CARBON DIOXIDE IN WATER, (IN UKRANIAN),
Akademiya Nauk URSR, Kiev. Inst. Hidrobiologii.
N. I. Kotsar.
Dopov Akad Nauk Ukr Rsr Ser B Heol Khim Biol Nauky 9, p 826-829, 1976.

Descriptors: *Carbon dioxide, Carbonates, *Carp, Equations, *Hypercapnia, *Phosphates, Urine.

The dependence between the concentrations of free CO2 in the environment and carp blood (Cyprinus carpio) was studied within a CO2 range of 0.10-2.05 mmol/l of water. An equation was ob-

tained characterizing the dependence in a generalized form. The dynamics of CO2 and phosphate excreation in the urine was studied with respect to fish adaptation to hypercapnia. The limit level of biocarbonates in the blood plasma is established under which the intensity of their formation is balanced with the intensity of their excretion from the organism with hypercapnia.--Copyright 1977, Biological Abstracts, Inc.
W78-01556

EXTENT OF EFFLUENT INFLUENCE ON LAKE WATER DETERMINED BY BACTERIAL POPULATION DISTRIBUTIONS,
Ontario Ministry of the Environment, Rexdale. Lab Service Branch.
For primary bibliographic entry see Field 5B.
W78-01558

EXPERIMENTAL STUDY OF SOME PROBLEMS OF THE BIOLOGICAL EFFECT OF WATER TREATED BY A CONSTANT MAGNETIC FIELD, (IN RUSSIAN),
Medical Academy, Varna (Bulgaria).
For primary bibliographic entry see Field 5F.
W78-01561

ASSESSMENT OF THE ACUTE TOXICITY, GROWTH IMPAIRMENT, AND FLESH-TAINTING POTENTIAL OF A BLEACHED KRAFT MILL EFFLUENT ON RAINBOW TROUT (SALMO GAIRDNERI),
Ontario Ministry of the Environment, Rexdale. Water Resources Branch.
D. M. Whittle, and K. W. Flood.
Journal of the Fisheries Research Board of Canada, Vol 34, No 6, p 869-878, June, 1977. 1 fig, 27 ref, 7 tab.

Descriptors: *Pulp wastes, *Toxicity, *Rainbow trout, *Water pollution effects, Wastes, Industrial wastes, Water pollution sources, Bioassay, Effluents, Pulp and paper industry, Lethal limit, Animal growth, Taste, Fish, Aquatic animals, Aquatic life, Trout, Water pollution.

Static and continuous-flow bioassays utilizing juvenile rainbow trout were conducted on a bleached kraft mill effluent to assess the range of acute toxicity and related sublethal effects. The acute toxicity of the total mill effluent, as determined by static bioassay procedures, ranged from a 96-hr LC(50) value of 14-49.0% vol/vol. The results of these bioassays depended on testing methodology and effluent treatment systems employed by the mill. Continuous-flow bioassays conducted on the effluent produced 96-hr LC(50) values of 21.8 and 24.8% vol/vol. Growth rate of juvenile rainbow trout (1-2 g) held under continuous-flow conditions for 18 days was significantly reduced at 6% effluent concentration. Flavor of yearling rainbow trout (ca. 200 g) exposed to 3% effluent for 48 hr was significantly impaired. This effluent concentration, the lowest level impairing flavor, represents approximately 0.12 of the 96-hr LC(50) derived from continuous-flow bioassays. No significant flavor impairment was detected in fish exposed for 144 hr to a 2% effluent concentration. Flavor impairment at a 3% effluent concentration, the most sensitive sublethal response measured in this study, may also be the most critical response when assessing the economic impact of a kraft mill discharge to a freshwater ecosystem. (Witt-IPC)
W78-01562

DENSITY, DISTRIBUTION, AND MOVEMENT OF NIPIGON BAY FISHES IN RELATION TO A PULP AND PAPER MILL EFFLUENT,
Canada Centre for Inland Waters, Burlington (Ontario).
J. R. M Kelso.
Journal of the Fisheries Research Board of Canada, Vol 34, No 6, p 879-885, June, 1977. 5 fig, 15 ref, 1 tab.

Descriptors: *Pulp wastes, *Fish, *Water pollution effects, Wastes, Industrial wastes, Water pollution sources, Water pollution, Canada, Foreign countries, Distribution patterns, Fish populations, Density, Movement, *Lake Superior, Great Lakes.
Identifiers: *Nipigon Bay(Lake Superior).

The density of pelagic fish in accessible portions of Nipigon Bay, Lake Superior, was lower offshore (less than 100 fish/10,000 cu m) and greater nearshore (less than 1800 fish/10,000 cu m). Conditions at Red Rock, Ontario, caused intense aggregation there and caused species dominance to shift to suckers at the kraft mill discharge from yellow perch elsewhere. Plume shape and direction did not alter the localized pattern of distribution. Two typical responses to plume concentrations were found using suckers fitted with ultrasonic transmitters. Fish released in high discharge concentrations (greater than 15% dilution by volume) became disoriented for as much as several hours, then appeared to search for background conditions. Fish released in low discharge concentrations (less than 15%) immediately initiated an avoidance reaction. Although individuals tended to avoid areas of altered water quality, the community aggregated at Red Rock in response to, perhaps, increased production of benthic macroinvertebrates. Residence time was short in the area of altered water quality. (Witt-IPC)
W78-01563

LEUCOCRIT: A SIMPLE HEMATOLOGICAL TECHNIQUE FOR MEASURING ACUTE STRESS IN SALMONID FISH, INCLUDING STRESSFUL CONCENTRATIONS OF PULP MILL EFFLUENT,
British Columbia Research Council, Vancouver.
D. J. McLeay, and M. R. Gordon.
Journal of the Fisheries Research Board of Canada, Vol 34, No 11, p 2164-2175, November, 1977.

Descriptors: *Pulp wastes, *Water pollution effects, *Fish, Bioassay, Wastes, Industrial wastes. Water pollution sources, Rainbow trout, Salmon, Pulp and paper industry, Effluents, Bleaching wastes, Aquatic animals, Aquatic life, Trout.
Identifiers: Coho salmon, Kraft mills.

The number of leucocytes and thrombocytes in the circulating blood of fishes seems to reflect more accurately than the number of erythrocytes the fish's reaction to acute stress, including that caused by pollution. To facilitate the estimation of leucocytes in fish blood, a new test is being introduced called leucocrit, which is based on the determination of the volume of packed leucocytes-thrombocytes expressed as a percentage of the whole blood. The mean leucocrit values for juvenile coho salmon (Onchorhynchus kisutch) and rainbow trout (Salmo gairdneri) held in freshwater under a variety of conditions varied from 0.55 to 1.91%. Variations in age, species, food ration, degree of crowding, and prior disturbances of fish stocks were associated with these differences. Leucocrit and leucocyte-thrombocyte counts for both species were depressed from stock values after 96-hr or shorter (rainbow) exposure to stressful (high-temperature crowded) conditions; values for these measures were positively correlated but uncorrelated with hematocrit values. Leucocrit values for stocks of coho (1.30 plus or minus 0.27%) and rainbow (0.92 plus or minus 0.12%) were depressed due to transfer or acute exposure to bleached kraft pulp mill effluent. A 24-hr exposure to kraft mill effluent after 2 days' acclimation caused consistent leucocrit depressions, with median effective concentrations of 0.28 of the 96-hr LC(50) value for coho and 0.16 LC(50) for rainbow. Hematocrit showed less sensitive or consistent changes due to stress or effluent exposure than leucocrit. (Witt-IPC)
W78-01564

CONTRIBUTIONS TO THE ECOLOGY OF BENTHIC ALGAE IN THE ALPINE ZONE OF THE PYRENEES: II. CYANOPHYCEANS AND OTHER ALGAL GROUPS, (IN GERMAN),
Baden-Wuerttemberg Landesanstalt fuer Umweltschutz (West Germany). Inst. of Wasserund Abfallwirtschaft.
For primary bibliographic entry see Field 2H.
W78-01583

QUALITY OF EFFLUENTS FROM MECHANICAL PULPING PROCESSES,
Pulp and Paper Research Inst., Point Claire (Quebec).
For primary bibliographic entry see Field 5D.
W78-01659

ECOLOGICAL EFFECTS OF HEAVY METAL DISCHARGE IN A SALMON RIVER,
Umea Univ. (Sweden). Dept. of Biology.
S. Sodergren.
Institute of Freshwater Research, Drottningholm, Report No. 99, p. 91-131, 1976. 21 fig, 17 tab, 73 ref.

Descriptors: *Cobalt, *Heavy metals, Industrial wastes, *Chemical wastes, *Toxicity, *Salmonids, *Atlantic salmon, *Fish populations, *Nickel, *Bottom sediments, *Juvenile growth stage, *Acidic water, Aquatic plants, Aquatic animals, Path of pollutants, Water pollution sources, Invertebrates, Environmental effects, Ricklea River, Sweden.

The salmon population in the Ricklea river has been studied since 1961. In 1966 a drastic reduction in the numbers of sea-migration salmon smolts was recorded. An extensive investigation linked this decrease with heavy metal discharge, primarily cobalt, from a diamond factory. (Katz)
W78-01661

THE GROWTH AND YEAR-CLASS STRENGTH OF PERCH (PERCA FLUVIATILIS L.) IN SOME BALTIC ARCHIPELAGOES, WITH SPECIAL REFERENCE TO TEMPERATURE,
National Swedish Environment Protection Board, Stockholm. Research Lab.
E. Neuman.
Institute of Freshwater Research, Drottningholm, Report, No 55, p. 51-70, 1976. 8 fig, 9 tab, 24 ref.

Descriptors: *Fish populations, *Growth rates, *Growth stages, *Animal growth, *Age, Fish physiology, *Water temperature, *Air temperature, *Perches, *Animal metabolism, Population, Operular bone, Year class strength.

The effect of natural temperature variations on the yearly length increment and year-class strength of perch was investigated using the opercular bone as an age indicator. The year-to-year variation in growth and its dependence on temperature increased markedly with age. However, the correlation between growth and temperature dropped below the level of significance if the mean values of year classes were replaced by the length increments of single individuals in the analysis. (Katz)
W78-01662

ALTERATION AND DESTRUCTION OF ESTUARIES AFFECTING FISHERY RESOURCES OF THE GULF OF MEXICO,
National Marine Fisheries Service, St. Petersburg, FL. Southeast Regional.
W. N. Lindall, Jr, and C. H. Saloman.
Marine Fisheries Review, Vol. 39, No. 9, p. 1-7, 1977. 9 fig, 3 tab, 18 ref.

Descriptors: Estuaries, *Estuarine environment, *Estuarine fisheries, *Marine fisheries, Commercial fishing, Sport fishing, *Gulf Coastal Plain, *Gulf of Mexico, *Commercial shellfish, *Tidal waters, *Tidal marshes, Land management, *Land use.

Both the commercial and recreational fishing industries of the Gulf of Mexico are overwhelmingly dependent of estuaries. About 90 percent of the commercial catch and 70 percent of the recreational catch are made up of species that are estuarine dependent. Man's alteration of estuaries is threatening these fishery resources. Data from recently published inventories quantify the degree to which the estuarine environment is being altered. (Katz)
W78-01663

TOXICITY OF FOUR TOXICANTS TO GREEN EGGS OF SALMONIDS,
Fish and Wildlife Service, La Crosse, WI. Fish Control Lab.
L. E. Olson, and L. L. Marking.
The Progressive Fish Culturist, Vol. 37, No. 3, p. 143-147, 1975. 2 tab, 7 ref.

Descriptors: *Pescicides, *Fish eggs, *Fry, *Salmonids, *Salmon, *Trout, Fish physiology, *Toxicity, Mortality, Organic compounds, Rotenone, Antimycin A, Pesticides, Fish control agents, Bioassay, Brown trout, Chinook salmon, Lake trout, *Lampricides, *TFM, *Bay 73, *Noxfish, LC50, Coho salmon.

The toxicity of four piscicides to green eggs and fingerlings of various salmonid species was investigated. The eggs were more resistant than fingerlings to Bay 73, antimycin, and Noxfish. Egg and fingerling resistance to TFM was similar. In addition, the suitability of green eggs as test organisms was researched. (Katz)
W78-01664

A SOLENOID-ACTUATED CHEMICAL-METERING APPARATUS FOR USE IN FLOW-THROUGH TOXICITY TESTS,
Fish and Wildlife Service, Warm Springs, GA. Southeaster Fish Control Lab.
For primary bibliographic entry see Field 5A.
W78-01665

CONTROLLING GRASS CARP (CTENOPHARYNGODON IDELLA) WITH ANTIMYCIN, ROTENONE, AND THANITE AND BY ELECTROFISHING,
Fish and Wildlife Service, La Crosse, WI. Fish Control Lab.
K. B. Cumming, R. M. Burress, and P. A. Gilderhus.
The Progressive Fish Culturist, Vol. 37, No. 2, p. 81-84, 1975. 2 tab, 14 ref.

Descriptors: *Fish control agents, *Piscicides, *Rotenone, *Antimycin A, *Electro-fishing, *Electric shocking gear, *Carp, Toxicity, Pesticides, Mortality, Lethal limit, Sunfishes, Catfishes, *Thanite, *Selective toxicity, *Ctenopharyngodon, Grass carp. Herbivorous fish.

The grass carp, which was introduced into the United States in 1963 as an experimental fish to control aquatic weeds, is now commercially available throughout the nation and has escaped into natural waters. As a result, great concern has been expressed about the potential impact of this species on existing ecological relationships. The two piscicides (antimycin and rotenone) were very effective against grass carp, but also caused a high mortality among green sunfish. The unselective toxicity of Thanite also was a problem. Electrofishing was an impractical control method, but could prove useful as a survey tool to detect the presence of grass carp. (Katz)
W78-01666

SPAWNING SUCCESS OF FATHEAD MINNOWS ON SELECTED ARTIFICIAL SUBSTRATES,
Environmental Research Lab., Duluth, MN.
For primary bibliographic entry see Field 5A.
W78-01667

SALINITY TOLERANCE OF GAMBUSIA AFFINIS (BAIRD AND GIRARD) AND HETEROPNEUSTES FOSSILIS (BLOCH),
Basrah Univ., Al Basrah (Iraq). Dept. of Fisheries.
K. Al-Daham, and M. N. Bhatti.
Journal of Fish Biology, Vol. 11, p. 309-313, 1977. 4 tab, 4 ref.

Descriptors: *Salinity, *Salt tolerance, *Resistance, Fish physiology, *Animal metabolism, Mortality, *Sodium chloride, *Salts, *Saline water, *Calcium chloride, Sea water, *Dissolved oxygen, Freshwater fish, Potassium compounds, *Livebearers, *Heteropneustes.

Results are presented of a study on the salinity tolerance of two freshwater fishes. The two species were treated with various concentrations of sea water and three most common salts found in the saline waters of Iraq, namely sodium chloride, calcium chloride and potassium chloride. The mortality rates following these treatments were recorded. Both species showed the highest degree of resistance for sea water and sodium chloride, and the lowest degree of tolerance to potassium chloride. G. affinis was more resistant to these salts and sea water than H. fossilis. (Katz)
W78-01671

EVALUATION OF FUNGICIDES FOR HALIPHTHOROS MILFORDENSIS AND THEIR TOXICITY TO JUVENILE EUROPEAN LOBSTERS,
California Univ., Davis, CA. Inst. of Marine Resources.
D. Abrahams, and W. D. Brown.
Aquaculture, Vol 12, p 31-40, 1977. 1 fig, 6 tab, 10 ref.

Descriptors: *Toxicity, Mortality, *Fungi, *Pathogenic fungi, *Fungicides, *Lobsters, *Juvenile growth stage, *Animal diseases, Animal physiology, *Growth rates, Bioassay.
Identifiers: *Haliphthoros, *Malchite green, Furnace.

Twenty-two potentially fungitoxic compounds were evaluated for their in vitro inhibition of mycelial growth. Eight compounds completely inhibited mycelial growth at concentrations of 10 micrograms/ml or less. These eight compounds were then tested as to their toxic effects on juvenile lobsters. Significant mortality was observed upon lengthy exposure to these compounds. Molting during application of the chemical by the dip method appears to affect survival adversely. (Katz)
W78-01672

SHORT-TERM EFFECTS OF TWO SILVER SALTS ON TISSUE RESPIRATION AND ENZYME ACTIVITY IN THE CUNNER (TAUTOGOLABRUS ADSPERSUS),
National Marine Fisheries Service, Milford, CT. Milford Lab.
E. Gould, and J. R. MacInnes.
Bulletin of Environmental Contamination and Toxicology, Vol 18, No 4, p 401-408, 1977. 3 tab, 23 ref.

Descriptors: Fish physiology, *Animal metabolism, *Toxicity, *Silver, *Nitrates, *Heavy metals, *Respiration, *Oxygen requirements, *Salts, *Enzymes, Animal physiology, Metabolism.
Identifiers: Tissue analysis, Bioaccumulation, *Cunner, Tautogolabrus, *Silver salts.

The relative toxic effects of a 96-h exposure to silver nitrate and silver acetate were examined. Short-term exposure to 0.5 pp silver in either form causes respiratory distress. Differing responses were noted in an analysis of the activities of two liver enzymes. The nitrate salt induces a slightly higher metabolic stress than does the acetate. (Katz)
W78-01674

CONCENTRATION OF CADMIUM, COPPER, LEAD AND ZINC IN SIX SPECIES OF FRESHWATER CLAMS,
Northern Illinois Univ., DeKalb. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5B.
W78-01675

LOCALIZED MASS MORTALITY OF RED SEA URCHIN, STRONGYLOCENTROTUS FRANCISCANUS NEAR SANTA CRUZ, CALIFORNIA,
California Univ., Santa Cruz. Center for Coastal Marine Studies.
J. S. Pearse, D. P. Costa, M. B. Yellin, and C. R. Agegian.
Fishery Bulletin, Vol 75, No 3, p 645-648, 1977. 2 fig, 6 ref.

Descriptors: *Animal diseases, *Animal pathology, *Mortality, Population, *Epidermis, Pathology, Diseases, Coasts, California, Invertebrates, Benthos, Marine animals.
Identifiers: *Sea urchin, Santa Cruz(Calif).

Two instances of localized mass mortalities of red sea urchins in Central California were reported. Diseased animals were described as having test plates partially denuded of spines. This and other characteristics of the disease were very similar to those reported for a mass mortality in the San Diego area in 1970. The etiology of the disease remains unknown. (Katz)
W78-01677

SHORT-TERM THERMAL RESISTANCE OF ZOEAE OF 10 SPECIES OF CRABS FROM PUGET SOUND, WASHINGTON,
National Marine Fisheries Service, Seattle, WA. Northwest and Alaska Fisheries Center.
B. G. Patten.
Fishery Bulletin, Vol 75, No 3, pp 55-559, 1977. 2 tab, 11 ref.

Descriptors: *Crabs, *Commercial shellfish, *Electric powerplants, *Water cooling, *Thermal pollution, *Water temperature, *Steam turbines, *Standards, *Heat exchangers, *Heat transfer, *Heated water. *Thermal stress, Crustaceans, Washington.
Identifiers: *Zoeae, Cancer, Pagurus, *Puget Sound(Wash).

Zoeae of 10 crab species were subjected to tests that simulated thermal stress associated with steam-powered electric stations. Shortly after hatching, the unfed zoeae were subjected to conditions simulating passage through heat exchangers (held at elevated test temperatures for 20 min with an abrupt increase and decrease from ambient) or mixing with thermal plumes (held at test temperature 1 to 4 h with temperatures gradually rising and decreasing from ambient). Thermal conditions in heat exchangers are postulated to be more critical to the survival of zoea than mixing with thermal plumes. The maximum temperature that should be permitted in neat exchangers to protect the most sensitive species studied is 24C for the Puget Sound area. (Katz)
W78-01679

TOXICITY OF N-PHENYL-A-NAPHTHYLAMINE AND HYDRAZINE TO XENOPUS LAEVIS EMBRYOS AND LARVAE,
California Univ., Irvine. Dept. of Anatomy; and California Univ., Irvine. Dept. of Developmental and Cell Biology.
G. A. Greenhouse.
Bulletin of Environmental Contamination and Toxicology, Vol 18, No 4, p. 503-511, 1977. 8 fig, 4 tab, 10 ref.

Descriptors: *Toxicity, *Mortality, *Organic compounds, *Larval growth stage, *Embryonic growth stage, *Frogs, *Lethal limit, *Fuels, *Path of pollutants, Amphibians, Water pollution effects, Bioassay.
Identifiers: *Teratogens, *Xenopus.

Previous studies by the author have demonstrated the toxic and teratogenic nature of N-phenyl-a-naphthylamine and hydrazine. The data presented in this study establish the LD50 of N-phenyl-a-naphthylamine for Xenopus laevis larvae and the ED50 (teratogenic) of N-phenyl-a-naphthylamine, hydrazine, and 1,1-dimethylhydrazine for X. laevis embryos. (Katz)
W78-01680

TRACE METAL CONCENTRATIONS IN TWO SHELLFISH SPECIES OF COMMERCIAL IMPORTANCE,
Raytheon Oceanographic and Environmental Services, Portsmouth, RI.
For primary bibliographic entry see Field 5A.
W78-01681

BEHAVIOR OF MERCURY IN BIOSYSTEMS I. UPTAKE AND CONCENTRATION IN FOOD-CHAIN,
Georgia Univ., Athens. Dept. of Food Science.
For primary bibliographic entry see Field 5B.
W78-01682

MERCURY IN FISH AND SHELLFISH OF THE NORTHEAST PACIFIC. III. SPINY DOGFISH, SQUALUS ACANTHLAS,
National Marine Fisheries Service, Seattle, WA. Northwest and Alaska Fisheries Center.
For primary bibliographic entry see Field 5B.
W78-01683

5D. Waste Treatment Processes

CATALYTIC PROCESS FOR OZONATION OF WATER CONTAINING ORGANIC CONTAMINANTS,
Environmental Research and Application, Inc., Briarcliff Manor, NY. (Assignee).
A. Turk.
U.S. Patent No. 4,029,578, 6 p, 2 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 959, No 2, p 752, June 14, 1977.

Descriptors: *Patents, *Water treatment, *Water purification, *Waste water treatment, Industrial wastes, Ozone, Catalysts, Metals.
Identifiers: Ozonation.

Water containing orgaic cantaminants is ozonated by contacting the water with ozone in the presence of a mixed heterogeneous catalyst comprising water insoluble salts, preferably an insoluble carbonate, sulfate, oxide, halide or sulfide, of at least two metals selected from the group consisting of copper, cadmium and the Group VIII metals, preferably iron, cobalt or nickel. During ozonation, the pH of the water is monitored and it is adequately buffered, if necessary, so as to maintain a pH within the range of about 6.8 to about 7.8. The catalyst is supported on an insoluble carrier such as aluminum oxide or a simple or complex silicate and is of a controlled particle size and density. (Sinha-OEIS)
W78-01189

PROCESS AND APPARATUS FOR THE PURIFICATION OF ORGANICALLY CONTAMINATED SEWAGE,
Linde A.G., Wiesbaden (West Germany). (Assignee).
H. Reimann.
U.S. Patent No. 4,029,574, 6 p, 2 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 959, No 2, p 751, June 14, 1977.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, Water pollution treatment, Organic wastes, Oxygen, Aeration, Activated sludge, Gases, Oxygenation, Carbon dioxide.

An activated sludge process for the purification of sewage by aerating a sewage-activated sludge mixture with oxygen or oxygen-enriched air is described. At least a portion of the gaseous mixture exiting from the aeration tank is collected, at least a portion of gaseous metabolic product is separated, and the purified gas is recycled to the aeration tank. Concentration gradients of O2 and gaseous metabolic products are thereby reduced, improving the efficiency of the sewage treatment processing, and pure CO2 can be recovered as an end product. (Sinha-OEIS)
W78-01193

TREATMENT OF WATER CONTAINING CYANIDE,
Thiokol Corp., Newtown, PA. (Assignee).
W. N. Christensen, and L. W. Poulter.
U.S. Patent No. 4,029,557, 4 p, 2 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 959, No 2, p 746, June 14, 1977.

Descriptors: *Patents, *Waste water treatment, *Industrial wastes, *Water pollution treatment, Water pollution control, Electrolysis, Sodium chloride, Chlorine, Chemical reactions.
Identifiers: *Cyanide, Metal processing industries.

The greatest source of cyanide bearing waste is the rinse water, spillage, and drippings from electroplating solutions. A process for destroying cyanide in such waste water comprises adding ordinary salt (NaCl) to the water, passing it through an electrolytic cell, where chlorine and caustic are generated from the salt, and passing the water into a wash tank where the chlorine reacts with the cyanide. The chlorine and caustic immediately react with the metal-cyanide compounds to produce metal hydroxide precipitates, while the cyanide is decomposed and liberated from the water in carbon dioxide and gaseous nitrogen. As part of this reaction, the sodium chloride is reformed, so that the same brine can be recycled and the process repeated without further additives. The optimum pH of between 7 and 8 may be maintained as needed by addition of small amounts of hydrochloric acid to the system. (Sinha-OEIS)
W78-01194

METHOD AND APPARATUS FOR PURIFYING WATER CONTAMINATED WITH ANODICALLY OXIDIZABLE ORGANIC MATTER,
Sachs-Systemtechnik G.m.b.H., Schweinfurt (West Germany).
A. Reis, K-E. Quentin, and L. Weil.
U.S. Patent No. 4,013,554, 5 p, 2 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 956, No 4, p 1378-1379, March 22, 1977.

Descriptors: *Patents, *Waste water treatment, *Water purification, *Water quality control, *Electrolysis, Adsorption, Anodes, Cathodes, Membranes, Equipment.

This invention relates to the purification of water contaminated with organic matter particularly anodically oxidizable organic matter. Contaminated water is pumped through the anode compartment of an electrolytic cell which is separated from the cathode compartment by a diaphragm permeable to water and to inorganic ions. Particles of hydrophilic, electrically conductive, carbonaceous material capable of adsorbing the contaminants are retained in the anode compartment by the diaphragm and by screens in the water discharge conduit and are held in turbulent suspension by the flowing water so that they make intermittent conductive contact with the anode surface. (Sinha-OEIS)
W78-01195

FLUID TREATMENT METHOD,
Iconex Systems Inc., Stamford, CT. (Assignee).
E. L. Karlson.
U.S. Patent No. 4,013,553, 7 p, 6 fig, 14 ref; Official Gazette of the United States Patent Office, Vol 956, No 4, p 1378, March 22, 1977.

Descriptors: *Patents, *Waste water treatment, *Industrial wastes, *Sewage treatment, Water pollution treatment, Separation techniques, *Ion exchange, Equipment.
Identifiers: Continuous belts.

The invention comprises a continuous, ionically biasable foraminous belt moving along a path forming a number of transversals of the flow path which are sequentially counter-directional to the direction of the flow of the fluid. Associated with the apparatus is a means for removing solids collected on the belt and for re-establising the ion potential. These functions are achieved by means of a solid waste removal column containing an internal spray pipe having high pressure spray nozzles. Next in tandem along the line of travel of the belt is an ion re-charger of known design by which the ionized bias (i.e., either anionic or cationic, according to the ionization of the materials to be extracted) of the belt is re-established. This recharger is followed by a water rinse tank to remove any excess ion recharging material left on the belt. Various carrier rolls outside of the tank support the belt along its path of travel and provide directional changes. (Sinha-OEIS)
W78-01196

METHOD FOR THE RECYCLE TREATMENT OF WASTE WATER FROM CHROMIUM PLATING,
Kayabakoyo-Kabushiki-Kaisha, Tokyo (Japan). (Assignee).
T. Hayashi.
U.S. Patent No. 4,012,318, 13 p, 6 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 956, No 3, p 957-958, March 15, 1977.

Descriptors: *Patents, *Waste water treatment, *Industrial wastes, *Ion exchange, Chemical reactions, Cation adsorption, Anion adsorption, Chromium, Resins, Water reuse.
Identifiers: Metal plating industry.

A method is described for the recycle treatment of chromium plating waste water. The process improves the rate of recovery of chromic acid, extends the life of the ion exchange resins, and prevents the formation of sludge. The process is characterized by the treatment, under neutral conditions, of the chromium plating waste water, from which the iron and other metallic components have been removed by the addition of sodium hydroxide or calcium hydroxide followed by precipitation, and by the subsequent adsorption of sodium or calcium with cation resins, before the adsorption of dichromic acid ions on the anion resins. Through such treatment, the exchange efficiency of the resins is improved, and the direct recycling of the dichromic acid solution is made possible because of its purity. Each of the resin beds is regenerated by the use of sulfuric acid, and the waste water from each of the beds is converted into the innocuous form of sodium sulfate solution which may be recycled for washing the plated products or discarded into rivers. (Sinha-OEIS)
W78-01201

METHOD FOR RECLAIMING VARIEGATED WASTES,
W. Josephs.
U.S. Patent No. 4,012,219, 4 p, 1 fig, 18 ref; Official Gazette of the United States Patent Office, Vol 956, No 3, p 931, March 15, 1977.

Descriptors: *Patents, *Waste water treatment, *Water pollution treatment, *Desalination, Sewage treatment, Domestic wastes, Suspended solids, Clays, Mixing, Adsorption, Settling basins, Water reuse.

Identifiers: Dredging spoils.

A method for reclaiming variegated wastes such as garbage, sewage and saline dredging spoils comprises the desalinization of clay-bearing dredging spoils by first dumping the spoils into corrals located on the shore of a saline body of water. The spoils are permitted to settle, and the salt water is drained or pumped away. The resulting mud is a low salinity, clay-bearing material. This material is then used to treat the sewage and garbage. The garbage is cleaned to remove useful materials, and the remaining, highly-organic material is shredded and mixed with water to form a slurry. It is then mixed with raw sewage from municipal sewage collection pipes, and with the desalinated dredging spoils. This mixture is then pumped through a pipe-line or other suitable means to a treatment and reclamation area. In transit, the movement of the mixture provides an agitating action, which exposes the clay particles of the spoils to the suspended solids and dissolved contaminates in the mixture. The clay particles act as a nucleating agent for the solids and contaminants, adsorbing as much as two and one-half times their weight of these substances. At the treatment site the mixture is further agitated if required, and placed in settling tanks. The organically rich solids are removed and composted to form a rich soil suitable for agriculture. The water is used for irrigation or is purified and used for industry or agriculture, or released. (Sinha-OEIS)
W78-01203

SKIMMER APPARATUS FOR SEWAGE SETTLING TANKS AND THE LIKE,
Sybron Corp., Rochester, NY. (Assignee).
R. F. McGivern.
U.S. Patent No. 4,011,164, 7 p, 8 fig, 12 ref; Official Gazette of the United States Patent Office, Vol 956, No 2, p 569, March 8, 1977.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, *Settling basins, Water pollution treatment, Skimming, Scum, Oily water, Equipment.

A scum removal system for sewage settling tanks employs a floating skimmer system which is lowered onto the surface of the liquid at one end of the tank and then moved toward the opposite end where floating materials collected by the skimmer are passed into a scum through end of the tank, the skimmer is raised from the surface of the liquid and returned to the first end while being held above the liquid surface. Continuous flow into the scum trough is prevented by a floating beach hinged to the scum trough. The beach is submerged as the skimmer approaches so that flow over the submerged beach carries the collected by the depth as well as the length of time that the beach is held beneath the surface. (Sinha - OEIS)
W78-01206

TREATMENT OF WASTE WATER PRODUCED IN THE MANUFACTURE OF EXPANDABLE POLYSTYRENE,
Badische Anilin-und Soda-Fabrik A.G., Ludwigshafen am. Rhein (West Germany).
K. H. Popp, K. Hess, W. Simmler, R. Stickel, and L. Zuern.
U.S. Patent No. 4,011,161, 6 p, 2 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 956, No 2, p 568, March 8, 1977.

Descriptors: *Patents, *Waste water treatment, *Industrial wastes, *Organic wastes, *Water purification, Biochemical oxygen demand, Foaming, Bubbles, Foam separation, Detergents, Separation techniques.
Identifiers: Expandable polystyrene.

Waste water produced in the manufacture of expandable polystyrene contains organic components consisting of unfoamed polystyrene in the form of beads of various sizes and also finely divided solid impurities in suspension (styrene emulsion polymers) and portions of the protective colloids in the bead polymerization. Such waste waters have a fairly high biochemical oxygen demand (BOD). The suspended solids give the waste water a milky appearance and are stabilized against coagulation or flocculation by the presence of residues of the suspension stabilizer used. The invention comprises passing a stream of fine gas bubbles through the waste water and removing the resulting foam containing a high concentration of suspended matter from the aqueous phase. If desired, detergents may be added to the waste water in order to increase the foaming effect and thus improve the clarifying activity. If necessary, the waste water remaining after removal of the foam may be subjected to an aftertreatment such as ultrafiltration, ozonization, treatment with activated charcoal and the like. (Sinha - OEIS)
W78-01208

PROCESS FOR PURIFYING WASTE WATER BY ELECTROLYSIS,
Nippon Risui Kagaku Kenkyusho (Japan). (Assignee).
T. Ito, and H. Yamazaki.
U.S. Patent No. 4,011,151, 4 p, 5 ref; Official Gazette of the United States Patent Office, Vol 956, No 2, p 565, March 8, 1977.

Descriptors: *Patents, *Waste water treatment, *Industrial wastes, *Water purification, Water pollution treatment, Water quality control, *Electrolysis, Hydrogen ion concentration, Filtration, Cathodes, Anodes.
Identifiers: Dye stuffs.

A process for purifying waste water by electrolysis in two steps is disclosed. In the first step, the electrolysis is effected by dipping an iron anode and a carbon cathode in the waste water (pH of about 7) to be purified until a pH of 11 is reached. The water is filtered to remove the precipitate which has formed. In the second step, the pH of 11 of the filtrate is adjusted to about 4 by electrolysis with a carbon anode and an aluminum cathode or by adding an acid and then the electrolysis of the filtrate is effected by dipping an iron anode and an aluminum or aluminum base alloy cathode in the filtrate. (Sinha-OEIS)
W78-01212

LIQUID TREATMENT APPARATUS HAVING PARALLEL ROTATING BAFFLES,
N. G. Jarvstrat.
U.S. Patent No. 4,010,102, 7 p, 9 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 956, No 1, p 214, March 1, 1977.

Descriptors: *Patents, Waste water treatment, *Water purification, *Water pollution treatment, *Water quality control, Biological treatment, Aeration, Equipment.

An apparatus for the biological treatment of water has disc elements aligned in an axial row which can be rotated. A housing rotatably journaled on a raft is provided with a pump to force air and water through it. The housing contains discs having central holes and other discs having peripherial apertures at the wall of the housing. Each disc forms a baffle for air and water flows through the housing, thereby imparting a tortuous path to the air and water. The discs are corrugated and are arranged in a stack with the corrugations of adjacent discs oriented at right angles. The corrugations strengthen the discs and form support points where the discs contact each other and define channels for water and air flow. A spiral pump rotating with the inlet end of the rotor forces metered volumes of water and air through the rotor. (Sinha-OEIS)
W78-01217

AERATING SYSTEM,
Zodar Corp., Warwick, RI. (Assignee).
R. L. Clough, Jr, and J. F. Snow.
U.S. Patent No. 4,029,581, 8 p, 8 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 959, No 2, p 753, June 14, 1977.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, *Water pollution treatment, Industrial wastes, *Aeration, Bubbles, Equipment.
Identifiers: Agitation.

This invention relates to the treatment of sewage, industrial wastes, stagnant ponds and pools, and more particularly to agitation and aeration of polluted bodies of water to enhance treatment through the medium of bacterial and chemical action. The apparatus comprises flexible, inflatable cells at or near the bottom of the liquid holder and means for supplying and withdrawing air to and from the cells so they periodically inflate and deflate. The surrounding liquid is agitated by the varying water displacement of the cells. In the preferred embodiment the cells are inflated sequentially to produce a wave of agitation in the surrounding liquid. Aeration and deflation are accomplished by providing the cell with pores, holes, or orifices that permit gas to escape from the cells into the surrounding liquid at restricted rates to form small bubbles that rise in the liquid and make intimate contact with suspended solids. (Sinha-OEIS)
W78-01218

WHITHER POLLUTION CONTROL,
For primary bibliographic entry see Field 5G.
W78-01220

WATER RESOURCES - THE PRODUCTIVE CONTRIBUTION OF POLLUTION CONTROL,
For primary bibliographic entry see Field 5G.
W78-01221

WASTEWATER LOANS READIED BY EPA.
For primary bibliographic entry see Field 5G.
W78-01223

POLLUTION CONTROL AND LEGISLATION IN THE FEDERAL REPUBLIC OF GERMANY,
For primary bibliographic entry see Field 5G.
W78-01224

POLLUTION CONTROL AND LEGISLATION--THE DUTCH APPROACH,
Public Health and Environmental Protection (Netherlands).
For primary bibliographic entry see Field 5G.
W78-01225

EPA INDEXES SHOW SHRINKING COST HIKES.
For primary bibliographic entry see Field 5G.
W78-01226

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE DELAWARE COUNTY, OHIO BOARD OF COMMISSIONERS, OLENTANGY ENVIRONMENTAL CONTROL CENTER AND INTERCEPTOR SYSTEM.
Environmental Protection Agency, Chicago, IL.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 280, Price codes: A22 in paper copy, A01 in microfiche. Technical Report EPA-5-OH-Delaware-XX-WWTP. July 1976. 501 p, 36 fig, 20 tab, 9 append.

Descriptors: *Environmental effects, *Ozone, *Ammonia, *Treatment facilities, *Interceptor sewers, On-site investigations, Sewage treatment, Municipal wastes, Public health, *Waste water treatment, *Ohio.
Identifiers: Olentangy River(OH), Delaware County(OH), *Environmental Impact Statements.

The final environmental impact statement for the proposed Olentangy Environmental Control Center and Interceptor System in Delaware County, Ohio, is presented. The project includes a 1.5-mgd sewage treatment facility with a peak capacity of 3.4 mgd. The treatment process includes a two-stage activated sludge facility, phosphate removal, tertiary rapid sand filtration, chlorination, post-aeration, disinfection with ozone, anaerobic digestion of sludge, and disposal of treated sludge to a state-approved sanitary landfill site. The proposed cost for the control center and interceptors was $11.05 million. A description of the environment without the proposed project is presented, including topography, geology, soils, groundwater, surface water, biology, air quality, land use, historic and archaeological sites, environmentally sensitive areas, population projections, economic forecasts, and aesthetics. Alternatives to various aspects of the proposed project are described, including flow reduction measures, interceptor alternatives, site location, treatment process approaches, discharge point selection, and methods of sludge disposal. The effects of the Olentangy project are evaluated with respect to water quality and quantity, air, land use, biology, and the general environment. (Schulz-FIRL)
W78-01230

ELASTICIZED POLYOLEFIN POND LINING HELPS MASONITE MEET NOVA SCOTIA STANDARDS.
Water and Pollution Control, Vol 115, No 7, p 23-24, July, 1977.

Descriptors: *Construction materials, *Linings, *Settling basins, *Oxidation lagoons, *Pulp and paper industry, Treatment facilities, Elastomers, Aeration, Equipment, Industrial wastes, *Waste water treatment.
Identifiers: *Polyolefin.

A $2.5 million water pollution control system has been designed by W. N. Horner and Associates Ltd for the Masonite Canada Ltd hardboard plant in East River, Nova Scotia. The plant must meet Canadian regulations which require that rainbow trout must have an 80% survival rate when immersed in 65% effluent for 96 hr. The facility includes a pollution monitoring system and an extended treatment plant with a total capacity of 6 million gal. A 175-ft by 175-ft, 1 million gal equalization pond and a 276-ft by 171-ft, 5 million gal treatment pond were lined with Du Pont's 3110 elasticized polyolefin pond and pit lining system. The sheeting was installed in 20-ft wide, 200-ft long rolls and the sheets were joined with a portable, hand-held electric welder. The lining was anchored at the edges of the basins with 18-in deep ditches which were backfilled after the lining was emplaced. Flexible rubber cord inserted into a dovetailed groove was used to anchor the sheeting into concrete reglets at the base of the concrete clarification chambers separating the two treatment ponds. (Schulz-FIRL)
W78-01231

A BETTER ENVIRONMENT, A BETTER ECONOMY.
Compressed Air, Vol 82, No 6, p 16-19, June, 1977.

Descriptors: *Oxidation, *Pulp wastes, *Pulp and paper industry, *Municipal wastes, *Industrial wastes, Treatment facilities, Incineration, Equipment, Sewage treatment, Multi-purpose projects, Activated sludge, Heat treatment, *Waste water treatment.
Identifiers: Ontonagon(MI).

The Zimpro wet air oxidation process, produced by Zimpro, Incorporated, of Rothschild, Wisconsin, is being used at the Hoerner Waldorf Corporation pulp and paper mill in Ontonagon, Michigan. Spent liquor from the papermaking process is fed into a 105-ft high, 342-ton pressure cylinder in which organic material is oxidized, resulting in a product which has 10% of its initial volume. The process also eliminates BOD and COD. Chemicals which survive the treatment process are reused and as much as 80% of the total energy input to the system is recovered as steam, hot water, and electricity. The Zimpro system at the Hoerner Waldorf plant also treats municipal sewage from the village of Ontonagon, eliminating the need for a separate municipal waste water treatment facility. At Ontonagon, spent liquor is combined with waste activated sludge, agitated, and heated before entering the reactor. (Schulz-FIRL)
W78-01232

PHYSICAL CHARACTERIZATION AND MICROBIOLOGICAL SETTLING-RATE MODIFICATION OF AQUEOUS SUSPENSIONS FROM HOT-WATER-PROCESS OIL-SANDS EXTRACTION,
Victoria Univ. (British Columbia). Dept. of Chemistry.
M. B. Hocking.
Fuel, Vol 56, No 3, p 334-339, July, 1977. 4 fig, 2 tab, 13 ref.

Descriptors: *Biodegradation, *Microorganisms, *Fuels, *Oil wastes, *Oil industry, Oily water, Organic wastes, Bacteria, Pilot plants, Separation techniques, Industrial wastes, Waste water treatment.
Identifiers: Bitumen, Oil sands.

Experiments were conducted to evaluate the use of indigenous microorganisms to degrade the organic fraction of the aqueous wastes resulting from the extraction of bitumen from oil sands by the hot-water process. Samples of Bird-centrifuge underflow, scavenger-cell underflow, and tailings pond sediment were obtained from the Great Canadian Oil Sands, Ltd. Urea was used as a nutrient in tests with aerobic and anaerobic cultures. Short term high-efficiency aeration was examined with a specially constructed borosilicate-glass aerator. Composite sludge samples were analyzed for inorganic solids, bitumen content, carbon, hydrogen, and nitrogen. A composite sample derived from a clear aqueous layer in the sample drums was enriched with ammonium-nitrate and used in experiments with long-term aeration and long-term nitrogen agitation. Long-term aeration was also studied with a sterile composite suspension sample. Results indicated that solids separation of tar-sands hot-water process wastes could be improved by the use of microorganisms, particularly with aerobic indigenous species, with the organic substrate of the tar sand. (Schulz-FIRL)
W78-01233

EFFECT OF CHEMICAL AGENTS ON SETTLING RATES OF SLUDGES FROM EFFLUENT OF HOT-WATER EXTRACTION OF ATHABASCA OIL SANDS,
Victoria Univ. (British Columbia). Dept. of Chemistry.
M. B. Hocking, and G. W. Lee.
Fuel, Vol 56, No 3, p 325-333, July, 1977. 8 fig, 35 ref.

Descriptors: *Sands, *Oily water, *Oil wastes, *Separation techniques, *Settling basins, Settling velocity, Suspended solids, Centrifugation, Industrial wastes, *Waste water treatment, Flocculation, Hydrogen ion concentration, Mining, Mine wastes.
Identifiers: Oil sands.

Hot water extraction has been used to extract bitumen from oil sands as a froth and separate out the siliceous material. The tailing pond sludges which are produced in the process consist largely of water, clay, and bitumen mixtures with a volume greater than the volume of the initial sands mined. A reduction in the water content of the tailings fines is one of the major goals of industrial waste treatment for oil sand sludges. Laboratory experiments with tailing pond sludges obtained at the Great Canadian Oil Sands operation in Fort Murray, Alberta, were used to investigate various methods of chemical treatment to decrease the settling times of hot-water process tailings fines. The zero point of discharge for the aqueous sludge suspension with a density of 1.126 mg/liter was at pH 2. The effect of surface-active agents on the extraction of residual bitumen was investigated with methylene chloride and anhydrous sodium sulfate. Studies on the effect of inorganic flocculations on settling rates indicated that the hydrogen ion as 0.1% HCL increased the settling rate by 11.6% and was more effective than calcium chloride, calcium carbonate, and barium chloride. The effects of pH modification and pressure digestion on the settling rate of the suspension were also examined. Treatment with isobutane to form solid clathrate hydrates did not significantly enhance settling. Proprietary polymeric flocculating agents were reported as more efficient at enhancing settling than packing. Additional tests were conducted to examine centrifuge settling rates produced by oxidizing and reducing agents, including O3, SO2, and H2O2. (Schulz-FIRL)
W78-01234

HOW TO HANDLE DIFFICULT EFFLUENT STREAMS.
Modern Power and Engineering, Vol 71, No 3, p 32-33, March, 1977.

Descriptors: *Oxidation, *Membrane processes, *Reverse osmosis, *Solvent extractions, *Separation techniques, Chemical wastes, Oil wastes, Electrodialysis, porous media, Ozone, Chlorination, Filtration, Industrial wastes, Waste water treatment.

Various processes for handling difficult industrial waste streams are discussed. Solvent extraction for the removal and recovery of organic chemicals in waste water is described. Membrane processes such as ultrafiltration, reverse osmosis, and electrodialysis are examined for removal of oils and ionized salts from waste water. Chemical oxidation with chlorine, ozone, hydrogen peroxide, and chlorine dioxide is discussed. The use of a rigid silica medium is suggested as eliminating the need for backwashing and forced aeration to maintain biological oxidation process efficiencies. (Schulz-FIRL)
W78-01235

SEWAGE SLUDGE,
For primary bibliographic entry see Field 5E.
W78-01236

REVERSE OSMOSIS AND ULTRAFILTRATION OF OILY AND PULPING EFFLUENTS,
Union Carbide Corp., Tuxedo, NY.
I. K. Bansal.
Industrial Wastes, Vol. 23, No. 3, p 32-37, May/June, 1977. 5 fig, 6 tab, 6 ref.

Descriptors: *Membrane processes, *Reverse osmosis, *Filtration, *Oily water, *Pulp wastes, Separation techniques, Emulsions, Industrial wastes, *Waste water treatment.
Identifiers: *Ultrafiltration.

Reverse osmosis (RO) and ultrafiltration (UF) are evaluated for industrial application in oil-water emulsion separation and in fractionation and concentration of kraft pulping effluents. Typical characteristics of carbon-support and sand-support reverse osmosis and ultrafiltration membranes are presented. Data on membrane performance with industrial effluents were collected at pilot-scale installations. An oil-concentrating system designed to produce clear water and recover concentrated oil allowed use of UF alone, RO alone, or purification of the UF permeate by RO. The three alternatives were evaluated in a

pilot-scale testing program to produce a clear permeate with less than 80 ppm of freon extractables from water-soluble oil coolant. Flow sheets and oil balances for each of the alternatives indicated that RO concentration of the UF permeate was the most feasible method considering the overall flux rate and module life. Costs for disposal of oily wastes are compared with those for treatment. UF and RO processes were also evaluated for treatment of screen room effluent from kraft pulping and for decolorization of kraft black liquor. (Schulz-FIRL)
W78-01237

PETROLEUM PROCESSING WASTES, (LITERATURE REVIEW),
Metcalf and Eddy, Inc., Des Plaines, IL.
D. A. Baker.
Journal Water Pollution Control Federation, Vol. 49, No. 6, p 1180-1182, June, 1977. 34 ref.

Descriptors: *Oil wastes, *Oil pollution, *Activated sludge, *Activated carbon, *Separation techniques, Bioassay, Costs, Energy, Filtration, Chemical wastes, Sludge treatment, *Waste water treatment, *Bibliographies, *Reviews, Organic wastes.
Identifiers: Petroleum processing wastes.

Literature pertaining to the processing of petroleum wastes is reviewed. The use of regenerated spent fluid catalytic cracking catalyst as an altenative to activated carbon treatment for enhancement of activated sludge treatment is discussed. Process variables in the use of the activated sludge process for refinery waste water treatment are presented. Biological treatment with rotating biological filters is described. The use of intermediate treatment facilities for contaminant reduction and equalization through hydraulic, chemical and physical designs is examined for the optimization of effluent processes. Methods of colloidal destabilization and filtration for make-up water clarification are described. Energy requirements and costs associated with refinery waste treatment are discussed. Bioassays used to test the effectiveness of refinery waste treatment are described. Results of studies on the use of activated carbon treatment to treat refinery waste waters are presented. (Schulz-FIRL)
W78-01238

INCONSISTENT WASTE OILS EFFICIENTLY RECLAIMED WITH CENTRIFUGES.
For primary bibliographic entry see Field 5G.
W78-01239

SCALE-UP OF GRANULAR MEDIA FILTERS,
Envirotech Corp., Salt Lake City, UT.
L. Lash.
Chemical Engineering Progress, Vol. 73, No. 4, p 67-73, April, 1977. 9 fig, 1 tab, 1 ref.

Descriptors: *Filtration, *Filters, *Oil wastes, *Design criteria, *Porous media, Pilot plants, Effluents, Operation and maintenance, Hydraulic design, Suspended solids, Industrial wastes, *Waste water treatment.
Identifiers: *Granular media filters.

Studies were conducted with parallel operation of semi-pilot and full-scale granular media filters to evaluate scale-up factors, the effects of feed variations and type of media, and the precision of experimental data. Granular media filter design factors were evaluated with respect to changes in the effluent solids level and pressure drop across the column with time during treatment of effluent from an API separator and a dissolved air flotation unit. The three plant-scale units were automatic, shallow bed, sand-filled filters equipped with a self-contained backwash operated in parallel with a full-scale filter. The refinery filter feed and effluent were analyzed for suspended solids, soluble total organic carbon, total COD, soluble COD, total oil, emulsified oil, pH, BOD, and temperature. Performance variables examined during the pilot-plant studies included: feed composition, pressure loss, total head loss buildup, effluent suspended solids and turbidity, effects of flow rate changes, and adequacy of backwash. Initial studies indicated that solids and fines were deposited as a dirty layer at the filter surface. Oil and suspended solids removal was considered effective but backwash was inadequate with both filter sizes. Media from the full-scale units were placed in the semi-pilot filters to evaluate effluent suspended solids as represented by turbidity and head loss distribution through the filter sections. (Schulz-FIRL)
W78-01240

NEW WASTE-WATER-TREATMENT UNIT INSTALLED.
Oil and Gas Journal, Vol. 75, No. 33, p 57, August, 1977.

Descriptors: *Filtration, *Oil wastes, *Separation techniques, *Suspended solids, Sands, Industrial wastes, Oil industry, Effluents, Porous media, Equipment, *Treatment facilities, Waste water treatment.
Identifiers: *Sand filters, Refinery wastes, Toledo(OH).

A $1.3 million sand filter is being used to provide waste water treatment for the Standard Oil Company of Ohio's refinery in Toledo. The waste water treatment facility was designed to bring refinery effluent into compliance with stricter Environmental Protection Agency regulations and should produce effluents with suspended solids concentrations well below the required levels. The system should meet all requirements for discharge into Otter Creek except those based on heat levels. The filtration system was produced by Hydro-Clear Corporation of Avon Lake, Ohio, and includes 1,750 sq ft of 12-in deep sand beds. The beds, which have a filtering capacity of 7,000 gal/min, are used to treat effluent and storm water which have been subjected to previous treatment in oil separators, dissolved air-flotation units, and an activated sludge-type biological treatment plant. Suspended solids levels in the treated effluent are lower than those found in raw water drawn from Maumee Bay for refinery use. (Scuhlz-FIRL)
W78-01241

A NEW METHOD OF DISPOSAL OF BY-PRODUCT ACID SLUDGE FROM A LUBE RE-REFINING PLANT,
Hindustan Petroleum Corp. Ltd., Bombay (India).
For primary bibliographic entry see Field 5E.
W78-01242

FORMATION OF STRIPPABLE METABOLIC PRODUCTS IN BIOLOGICAL WASTE TREATMENT,
Oklahoma State Univ., Stillwater. Bioenvironmental Engineering Labs.
A. F. Gaudy, S. R. Goswami, T. Manickam, and E. Gaudy.
Biotechnology and Bioengineering, Vol. 19, No. 8, p 1239-1244, August, 1977. 3 fig, 19 ref.

Descriptors: *Activated sludge, *Organic wastes, *Volatility, Microorganisms, Chemical oxygen demand, Aeration, Sludge treatment, Municipal wastes, *Waste water treatment, *Biological treatment.

The conversion of nonvolatile to volatile compounds by microorganisms was examined as a mechanism by which organic material may be removed from an aqueous waste by aeration. Experiments which attempted to determine whether stripping of organic material occurred during metabolism of a nonvolatile organic waste component employed glucose as a nonvolatile carbon source. A batch reactor was used to develop activated sludge from seed obtained from primary clarifier effluent from the municipal waste water treatment plant in Stillwater, Oklahoma. Sludge and glucose were fed to a sealed batch reactor in varying proportions. Compressed air was supplied to the reactor at a flow rate of 4000 cu m/min/liter. Data were taken on biological solids concentrations, glucose, and organic concentrations measured as COD in filtrate and absorbate obtained from periodic sampling of the reactor contents. The effect of pH of absorption efficiency was investigated in experiments with acetone, a neutral compound known to be readily strippable. In experiments with glucose at pH 10, glucose was removed rapidly from solution while the total COD in filtrates decreased and the biological solids increased. The accumulation and removal of organic metabolic intermediates from the original carbon source is discussed. (Schulz-FIRL)
W78-01243

CURRENT AND DEVELOPING APPLICATIONS FOR ULTRAFILTRATION,
Abcor, Inc., Wilmington, MA.
L. Mir, W. Eykamp, and R. L. Goldsmith.
Industrial Water Engineering, Vol 14, No 3, p 14-19, May/June, 1977. 6 fig, 5 tab.

Descriptors: *Membrane processes, *Filtration, *Separation techniques, *Oil wastes, *Chemical wastes, Textiles, Polymers, Industrial wastes, Filters, *Waste water treatment.
Identifiers: *Ultrafiltration, Latex, Polyvinyl alcohol, Oil-emulsion concentration.

The membrane process of ultrafiltration is discussed as a means of industrial waste treatment for electrocoat paint, whey protein recovery, oil emulsion concentration, and latex and polyvinyl concentration. Technical and economic characteristics of these uses of ultrafiltration are discussed, including separations, process conditions, flux, and fouling problems. Characteristics of oil-emulsion concentration systems are discussed. Waste cutting and grinding oils, waste rolling oils, and alkaline degreasing baths are the primary targets for oil-emulsion treatment in industry. Operating characteristics of oil-emulsion ultrafiltration units are presented for units operating in commercial installation. Research on the development of solvent-resistant membrane materials suitable for use in latex recovery is described. Applications of ultrafiltration for polyvinyl alcohol recovery in the manufacture of synthetic textiles are discussed. (Schulz-FIRL)
W78-01244

TEXAS WATERWAY PROVES CLEANUP TIDE IS TURNING,
For primary bibliographic entry see Field 5G.
W78-01245

OPTIMIZING GRANULAR MEDIA FILTRATION,
Standard Oil Co., Chicago, IL.
J. F. Grutsch, and R. C. Mallatt.
Chemical Engineering Progress, Vol 73, No 4, p 57-66, April, 1977. 11 fig, 5 tab, 11 ref.

Descriptors: *Filtration, *Colloids, *Zeta potential, *Electrical properties, *Polyelectrolytes, Electrochemistry, Chemical reactions, Porous media, Filters, Oily water, Oil wastes, Oil industry, Industrial wastes, *Waste water treatment.
Identifiers: *Granular media filtration.

The negative zeta potential or intrinsic surface charge associated with oil particles, silt, biocolloids, inorganic colloids, and other materials may affect granular media filtration efficiency. Mechanisms for retention of solids within the pores of granular media are described. Since previous studies have indicated that for effective filtration the filter media must have a surface charge

opposite to the charge possessed by the colloids, mechanisms of colloid destabilization are reviewed, including colloid entrapment or removal via the sweep floc mechanism, reduction in surface charge by double layer repression, bridging by polymers, and charge neutralization. The use of destabilization chemicals such as alum and polyelectrolytes is examined. Various aspects which might affect the applicability of chemical treatment of refinery wastes such as API separator effluent are discussed, including salinity, pH, zeta potential-cationic polyelectrolyte titration curves, and sulfide contents. Chemical destabilization with an effective cationic polyelectrolyte is recommended for API separator effluents. The hydraulic limitations on granular media filtration of the chemically treated effluent would then be related to the nature of the destabilized aggregates and the water temperature during filtration. (Schulz-FIRL)
W78-01246

REMOVING PHENOLS VIA ACTIVATED CARBON,
Louisville Univ., Ky.
J. S. Zogorski, and S. D. Faust.
Chemical Engineering Progress, Vol 73, No 5, p 65-66, May, 1977. 1 fig, 1 tab.

Descriptors: *Phenols, *Aromatic compounds, *Activated carbon, *Adsorption, *Chemical wastes, Organic wastes, Phenolic pesticides, Solids contact processes, Mass transfer, Industrial wastes, *Waste water treatment.
Identifiers: Granular activated carbon, 2-4-dichlorophenol, 4-methoxyphenol, 4-nitrophenol.

A total of 25 experiments were used to investigate the effects of various operational parameters on the removal of 2,4-dichlorophenol from water by fixed beds of activated carbon. Adsorbates measured in the effluent stream of a granular activated carbon column included phenol, 4-methoxyphenol, 4-nitrophenol, and 2,4-dichlorophenol. Breakthrough curves were determined at several hydronium ion concentrations. Three characteristics of the mass transfer zone were calculated for each column from breakthrough curves, including height of mass transfer zone, rate of movement of mass transfer zone, and fractional capacity of the absorbent with the mass transfer zone. The efficiency of the fixed bed contactor was evaluated with respect to size of adorbent, hydronium ion concentration, depth of adsorbent, and the type of adsorbate. The effects of these parameters on the characteristics of the mass transfer zone were measured. Studies indicated that the size of the mass transfer zone increased with the size of the adsorbent and the linear velocity, as well as when the acid dissociation constant of the adsorbate was less than the pH of the solution. Zone size was not affected by the type of adsorbate. The rate of movement was affected by the type of adsorbate, initial adsorbate concentration, linear velocity, and pH. The fractional capacity was influenced by the type of adsorbate, adsorbate concentration, and the adsorbent size. (Schulz-FIRL)
W78-01247

REMOVAL OF SOLUBLE MERCURY FROM WATER BY RUBBER,
Georgia Univ., Athens. Dept. of Food Science.
S. R. Wheeler, and M. K. Hamdy.
Bulletin of Environmental Contamination and Toxicology, Vol 17, No 2, p 150-158, February, 1977. 2 fig, 17 ref.

Descriptors: *Mercury, *Activated carbon, *Adsorption, *Rubber, *Chemical wastes, Metals, Analytical techniques, Filtration, Filters, Industrial wastes, *Waste water treatment.

Laboratory studies were used to evaluate the removal of soluble mercury from water by columns of ground rubber or activated carbon. Radioactive mercury nitrate was used as a tracer and a Beckman LS-100 C liquid scintillation spectrometer was used to detect mercury levels in the column eluates. Initial mercury concentrations in the effluents were 0.056, 50, and 500 ppm. Effluents were recirculated through the columns for 10 cycles. Cumularive decreases in mercury activity after 10 cycles through the activated carbon control column were 38.95% for 0.056 ppm, 9,40% for 50 ppm, and 1.10% for 500 ppm. With the rubber-filled column, cumulative decreases after 10 cycles were approximately 0.5 micrograms Hg/g of ground rubber for the 0.056 ppm solution, 250 micrograms/g for the 50 ppm solution, and 2000 micrograms/g for the 500 ppm solution. An equation relating the specific adsorption to the total radioactivity absorbed, the mercury concentration, the volume cycled, and the adsorbent weight is presented. (Schulz-FIRL)
W78-01248

STEEL INDUSTRY WASTES, (LITERATURE REVIEW),
Water Pollution Control Directorate, Edmonton (Alberta).
D. W. Smith.
Journal Water Pollution Control Federation, Vol. 49, No. 6, p 1172-1180, June, 1977. 82 ref.

Descriptors: *Steel, *Chemical wastes, *Iron, *Gases, *Metals, Water reuse, Air pollution, Fuels, Acidic water, Separation techniques, Metallurgy, Industrial wastes, *Waste water treatment, *Reviews, *Bibliographies.
Identifiers: Iron ore, Steel manufacture, Coke, Pickling waste water, Magnetic separation.

Literature pertaining to the treatment of waste resulting from various phases of steel production is reviewed. Effluent guidelines and standards proposed by the EPA for iron and steel manufacturing industries are described. Aspects of iron ore handling which are discussed include Canadian waste treatment practices, tailing disposal, process water conservation, and solids recovery. Methods for the treatment of gases and scrubbing solutions resulting from the production of coke are reviewed, including activated sludge, activated carbon, chemical treatment, clarification, and biological treatment. Analytical techniques for identifying waste products from coking operations are described. Studies on waste water characterization and treatment process evaluations for iron and steel production are reviewed, including magnetic separation and physical-chemical treatment. Methods for the recovery and treatment of spent HCL pickling liquor are described, including ion exchange, heat treatment, microflotation, chemical treatment, and sedimentation. (Schulz-FIRL)
W78-01249

SOLVING POLLUTION CONTROL PROBLEMS: A CASE HISTORY,
Brill Engineering Associates, Lancaster, PA.
F. W. Brill.
Industrial Wastes, Vol 23, No. 3, p 38-41, May/June, 1977. 3 fig, 3 tab.

Descriptors: *Zinc, *Metals, *Chrome, *Neutralization, *Chemical precipitation, Acidic water, Treatment facilities, Water conservation, Flow, Analytical techniques, Separation techniques, Industrial wastes, Effluents, Sewers, Municipal wastes, *Waste water treatment.
Identifiers: Chrome plating wastes, Zinc plating wastes.

A waste water pretreatment system was designed in response to excessive concentration of zinc in waste waters discharged to a municipal sewer by a plating company. The 3M Company, which provided equipment and proprietary chemicals for the plating process, presented information on the chemistry of its plating process and associated waste waters. Information on waste water flows and contaminants was collected for various phases of the zinc concentrations of 2 ppm, hexavalent and trivalent chromium concentration of 2 ppm, iron of 10 ppm, hexavalent and trivalent chromium concentrations of 2 ppm, iron of 10 ppm, and pH of 6-9. The proposed treatment scheme included mixing of plating waste which contained zinc in an acid medium with chromater rinse water to remove hexavalent chromium, as well as neutralization with sodium hydroxide to precipitate zinc, trivalent chromium, and heavy metals. Analyses of contaminants in waste water also indicated that water usage could be reduced during several phases of plating. A flow diagram for the batch pretreatment system which was produced with modifications to the plating process is presented. (Schulz-FIRL)
W78-01250

CANADIAN STEEL MILL MEETS EFFLUENT GUIDELINES.
Industrial Wastes, Vol. 23, No. 3, p 26-27, May/June, 1977.

Descriptors: *Steel, *Membrane processes, *Suspended solids, *Metals, *Treatment facilities, Filtration, Filters, Sludge treatment, Industrial wastes, *Waste water treatment, Water reuse, Sludge disposal, Water quality standards.
Identifiers: Rolling mill wastes, Steel manufacture, Ultrafiltration.

The $4.2 million water pollution control facility at Dominion Foundries and Steel Limited (DOFASCO) in Hamilton, Ontario, Canada, was constructed to comply with the Canadian Ministry of the Environment's 15 mg/liter suspended solids standard for process water effluents. The plant treats rolling mill water from the mill scale pits and primary settling basins. This waste water may contain as much as01W78-01253
W78-01252

U. S. STEEL'S SOUTH WORKS PROCESS WATER RECYCLE SYSTEM,
United States Steel Corp., Chicago, IL. Power Div.
H. W. Richardson.
Wire Journal, Vol. 10, No. 6, p 82-85, June, 1977. 1 fig.

Descriptors: *Steel, *Industrial water, *Water reuse, *Treatment facilities, *Clarification, *Recycling, Pollution abatement, Gases, Sewers, Suspended solids, Industrial wastes, *Waste water treatment.
Identifiers: *Gas washer water, Steel manufacture, Blast furnaces, Coding towers.

A three-step program to improve the quality of water discharged into Lake Michigan and the Calumet River by the United States Steel South Works in Chicago, Illinois, was initiated in 1965. The first phase of the project was to provide treatment for the gas washer water from the South Side blast furnace group. Two 33.5-m thickeners, vacuum filters, pumps, and necessary auxiliary equipment were used to provide primary treatment. The second phase of the system provided a recycle system for the gas washer water from the North Side blast furnace group, as well as a central treatment plant for primary treatment of all process water. Two 48-m thickeners provided primary treatment for gas washer water, a new sewer system was added to collect process water, and a new grit pit was installed for the collection of large particles. A cooling tower unit was installed to chill clarified effluent from the thickeners before it is recycled to the furnaces. Wet, high-energy, gas cleaning plants equipped with water recycling systems were installed to treat process water. The central water treatment plant includes two lift stations, three 38-m reactor clarifiers, a 19.8-m thickener, vacuum filters, and other necessary auxiliary equipment. In the third phase of the program, a recycle system was installed for gas washer water at the South Side blast furnace group. Complete recycling of all plant process

water was provided in the fourth phase of the program with gravity flow of effluent from reactor clarifiers to a surge tank. Three cooling towers receive water from the surge tank and discharge it through a 24.9-m tunnel to the process water pumping station. (Schulz-FIRL)
W78-01254

WASTE TREATMENT IN THE DANISH DAIRY INDUSTRY,
Statens Forsoegsmejeri, Hillerod (Denmark).
P. R. Poulsen.
Journal of Dairy Science, Vol. 60, No. 7, p 1187-1191, July, 1977. 1 fig, 4 tab.

Descriptors: *Dairy industry, *Milk, *Legal aspects, *Taxes, *Effluents, Biochemical oxygen demand, *Waste water treatment, Foreign countries, Food processing industry, Industrial wastes.
Identifiers: Denmark, Dairy wastes.

Characteristics, treatment, and disposal of dairy wastes in Denmark are discussed. Legislation pertaining to environmental protection and the apportionment of waste water treatment costs was passed in Denmark in 1975. Tariffs are imposed according to a base charge and a multiplication factor related to the amount of BOD in the industrial effluent. The Danish Government Research Institute for Dairy Industry conducted a study of effluents from 34 plants to examine wastes in terms of the total effluent produced, waste water characteristics, and the relationship between the amount of milk produced and the strength of the effluent. Comparisons between various dairy industry processes and the BOD content of the effluent revealed that cheese production resulted in 4 g BOD/kg milk, butter manufacture resulted in 2.0-2.5 g BOD/kg milk, and milk collecting and separating resulted in 0.5 g BOD/kg milk. (Schulz-FIRL)
W78-01255

TREATING WINERY WASTE USING AEROBIC LAGOONS,
Smith (S.) and Son Pty. Ltd., Angaston (Australia).
P. J. Wall, and G. R. Linton.
Food Technology in Australia, Vol. 29, No. 2, p 67-68, February, 1977. 2 fig, 1 ref.

Descriptors: *Food processing industry, *Biochemical oxygen demand, *Aeration, *Aerated lagoons, *Aerobic treatment, Treatment facilities, *Australia, Organic wastes, Industrial wastes, Effluents, Irrigation practices, Sprinkler irrigation, Waste water disposal, Waste water treatment.
Identifiers: *Winery wastes, Distillery wastes.

An aerobic lagoon waste water treatment system in use at the S. Smith and Son Proprietary Limited winery/distillery in Angaston, Australia, is described. The system includes a series of four interconnected lagoons and treats 20 million liters of rinse waste water, 3 million liters of distillery waste water, and 5 million liters of slightly alkaline bottle rinse water annually. As effluent flows by gravity through the earthen lagoon series, aerators maintain proper dissolved oxygen levels and mix waste in the first three lagoons. BOD in the effluent is reduced from 4000 mg/liter to 1500 mg/liter in the first lagoon, which has an aeration capacity of 350 kg BOD/day. The second lagoon with four aerators has an aeration capacity of 115 kg BOD/day. The third lagoon is a facultative aerobic system in which settled solids at the bottom of the lagoon undergo anaerobic digestion. The fourth lagoon, which also serves as a holding tank, provides additional oxygenation with surface absorption. Treated effluent from the $20,000 plant is used to provide spray irrigation for 3 hectares of pasture land. (Schulz-FIRL)
W78-01256

TREATMENT OF CONCENTRATED YEAST WASTE,
Taiwan Sugar Research Inst., Taiwan.
Y. T. Chuang, C. L. Lai, and S. L. Sang.
Taiwan Sugar, Vol. 24, No. 1, p 268-272, January-February, 1977. 12 fig, 5 ref.

Descriptors: *Fermentation, *Yeasts, *Cultures, *Activated sludge, *Methane, Food processing industry, Organic wastes, Biochemical oxygen demand, Industrial wastes, *Waste water treatment.
Identifiers: Yeast manufacturing wastes, *Taiwan.

Laboratory experiments were used to evaluate a method of waste treatment for use in the yeast manufacturing industry. Yeast wastes were obtained from the Hsinying Yeast Plant in Taiwan and anaerobic and activated sludges were obtained from facilities at the Taiwan Sugar Research Institute. The treatment process involved re-use of the yeast to reduce the waste volume by 50%, methane fermentation, and activated sludge treatment. Studies on the effects of initial pH, temperature, detention time, and sludge concentration on the anaerobic treatment of yeasts indicated that the optimum parameters were pH of 7.0, temperature of 37-39 C, a MLSS of 44 ppt, and a detention time of 10 days. For aerobic treatment the optimum operating parameters were MLSS of 10.8 ppt, pH of 7-8, temperature of 25-35 C, and a detention time of 6 hr. BOD of the Hsinying effluent was reduced with the process from an initial concentration of 3,000-6,000 ppm to approximately 140 ppm. (Schulz-FIRL)
W78-01257

ACTIVATED SLUDGE SYSTEM CLEANS CREAMERY EFFLUENT.
Environmental Protection Survey, p 5, 1977. 1 fig.

Descriptors: *Activated sludge, *Dairy industry, *Biological treatment, *Filtration, *Organic wastes, Sludge treatment, Effluents, Biochemical oxygen demand, Industrial wastes, *Waste water treatment.
Identifiers: Kantaurk(Ireland).

Local regulations in Kantaurk, County Cork, Ireland, required a 99.7% reduction of BOD in effluent produced by the North Cork Creamery, a casein plant which produces up to 5,000 gal/hr of effluent which contains caustic soda, nitric acid, traces of fats and oils, and as much as 6700 mg BOD/liter. A three-stage system which includes two biological treatment stages and activated sludge treatment was developed by Anderson and Martin in conjunction with Davenport Engineering. Effluent from the creamery travels through coarse and fine screens and a series of grease traps before flowing to a balance tank where nutrients are added to yield a BOD:N:P ratio of 100:5:1. BOD in the overflow from the mixing chamber is reduced by 55% in the first biofilter and further reduced by 60-65% in the second biofilter. An interstage settling tank removes excess bacteria, and sludge is periodically transferred to a sludge holding tank. Recycle pumps transfer clarified liquor from the first to the second biofilter. Two 7.5-hp surface units aerate the liquor in the activated sludge stage where the BOD is reduced to a final concentration of less than 20 mg/liter. Sludge from the final settling tank is returned to the aeration chamber by an airlift pump. Operation of the plant has indicated that the treatment process is capable of producing an effluent with BOD and suspended solids concentrations below the 20 and 30 mg/liter standards set by local authorities. (Schulz-FIRL)
W78-01259

USING CUSTOMIZED 'BUGS' FOR BIOLOGICAL WASTE TREATMENT,
Polybac Corp., New York.
T. G. Zitrides.
Plant Engineering, Vol. 31, No. 13, p 117-119, June, 1977. 1 fig, 4 tab.

Descriptors: *Bacteria, *Nutrient removal, Toxicity, *Sewage bacteria, *Organic wastes, Oil wastes, Pesticides, Textiles, Metals, *Biological treatment, Industrial wastes, *Waste water treatment.
Identifiers: Mutant bacteria.

The use of specially-bred bacteria for biological treatment of difficult-to process effluents is recommended for situations where toxic or thermal shock loads or toxic organic compounds such as chlorinated solvents, herbicides, and insecticides might otherwise inhibit the growth of naturally occurring bacteria. Customized bacteria have been developed through the mutation of individual strains for special characteristics such as the ability to thrive on petroleum products, grease, dyes, or other industrial waste products. The bacteria can be blended for a variety of wastes and are sold in a dried, packaged form which can be reactivated with hot water. Use of the bacteria may require the addition of nutrients or other substances to provide optimum conditions for growth. Results obtained with biological waste treatment with mutant bacteria additives are presented for several industries, including a steel mill, textile plant, oil refinery, and organic chemical plant. The dry mutant bacteria can also be used during startup to eliminate the need for municipal seed sludge and to minimize the effects of widely spaced, predictable shock loads. (Schulz-FIRL)
W78-01260

BREWSTER'S NEW PHOSPHATE WASHER PLANT.
Pit and Quarry, Vol. 69, No. 12, p 52-55, 58-60, June, 1977. 1 fig.

Descriptors: *Mining, *Phosphates, *Water reuse, *Settling basins, *Hydraulic mining water, Pumping, Overburden, Fertilizers, Mine wastes, Clays, Sands, Industrial wastes, *Waste water treatment, Return flow, Wells, Water utilization, *Florida.
Identifiers: Phosphate mines.

Lonesome Mine in Hillsborough County, Florida, is operated by Brewster Phosphates, a partnership between Cyanmid and Kerr-McGee Corporation, and is designed to yield 2.75 million tons per yr of marketable phosphate rock. Mining at the pit is by conventional processes with two 45-cu-yd capacity, electric draglines. The slurried material is screened, crushed by a mechanical impactor, and pumped to 48-in diameter hydrocyclones to produce a product which contains 70% solids. Details for processing to separate the tailings sand and the phosphate are described. The Lonesome Mine site is equipped to handle 6 million tons of phosphate rock per yr for wet storage, drying, and shipping. The principal wastes generated during phosphate mining include overburden, phosphate clays, and sand. The treatment technique employed by Brewster Phosphates for the phosphatic clay slurries with 3-5% solids includes storage to settle out the clays to 12-15% solids and sprinkling of tailings sand over the settled clay to produce a thick sand-clay mixture. After the excess water is drained off, overburden is spread over the surface and appropriate vegetation is planted. The use of recycled water and the return of water to the aquifer via connector wells reduces the net amount of water required for mining operations. (Schulz-FIRL)
W78-01261

ELECTROPLATING AND CYANIDE WASTES, (LITERATURE REVIEW),
Utah State Univ., Logan.
M. F. Torpy.
Journal Water Pollution Control Federation, Vol. 49, No. 6, p 1182-1188, June, 1977. 70 ref.

Descriptors: *Metals, *Nitrogen compounds, Chemical precipitation, Toxicity, Separation techniques, Ion exchange, Reverse osmosis, Organic wastes, Industrial water, Analytical

techniques, Electrochemistry, *Industrial wastes, *Waste water treatment, Adsorption, Activated carbon, Filtration, *Reviews, *Bibliographies.
Identifiers: *Cyanide, *Electroplating wastes.

Literature pertaining to the characteristics and treatment of electroplating and cyanide wastes is reviewed. Studies on the effects of electroplating effluents on biota and receiving waters are described. Costs, operation, and performance of electroplating waste treatment plants are discussed. Settling with chemical precipitation, coagulation, or flocculation is reviewed as a means of treating metal and cyanide wastes. Adsorption with activated carbon and recycling methods to reduce effluent discharges and water usage are discussed. Reverse osmosis and ion exchange are evaluated for use with metal wastes. Mechanisms and treatment processes for cyanide removal are reviewed, including heating and ammonia stripping, ozonation, ultraviolet irradiation, electrochemical processes, electrolysis, activated sludge, and quarternary amine solvent extraction. Analytical methods for measuring cyanide levels in waste water are described. The use of cyanide-free baths in electroplating is discussed. (Schulz-FIRL)
W78-01262

RECOVERY OF ORGANIC POLLUTANTS VIA SOLVENT EXTRACTION,
California Univ., Berkeley. Dept. of Chemical Engineering.
J. P. Earhart, K. W. Won, H. Y. Wong, J. M. Prausnitz, and C. J. King.
Chemical Engineering Progress, Vol. 73, No. 5, p 67-73, May, 1977. 5 fig, 7 tab, 15 ref.

Descriptors: *Solvent extractions, *Separation techniques, *Solvents, *Solutes, Chemical wastes, Solubility, Organic compounds, Distillation, Oil wastes, Industrial wastes, *Waste water treatment.
Identifiers: Dual-solvent extraction, Styrene, Spent-caustic processing, Oxychlorination, Butyl acetate, Isobutylene, Volatile solvents.

Various applications of solvent extraction as a means for removal and recovery of organic compounds in industrial waste water are discussed. The use of volatile solvents such as isobutylene, isobutane, and toluene is suggested to result in greater solvent recovery and lower water contamination. Relative costs, boiling points, water solubilities, and losses are presented for a variety of solvents. The degree of extraction by a solvent is related to the equilibrium distribution coefficients for the solute-solvent pairs, with high degrees of extraction occurring when the values are greater than 1.0. A table of previously determined equilibrium distribution coefficients for solute-solvent pairs is presented. Dual-solvent processes, in which the first extraction removes some compound(s) and the second extraction removes the first solvent, are discussed. Results are presented for the use of a pilot-scale system for continuous flow extraction and solvent regeneration for several synthetic and real industrial waste waters, including: styrene manufacture waste water, ethylene quench water, extractor condensate from spent-caustic processing, waste water from lube-oil refining, oxychlorination waste water, hydrofiner condensate waste water, and a waste water from phenol-formaldehyde resin manufacture. (Schulz-FIRL)
W78-01263

BRINE SHRIMP IS ACOMING, CLEAR EFFLUENT'S IN SIGHT.
Environmental Protection Survey, p 21, February, 1977.

Descriptors: *Food chain, *Chemical wastes, *Brine shrimp, Aquiculture, *Organic wastes, Bacteria, Aquatic life, Algae, Biochemical oxygen demand, Suspended solids, Effluents, Pilot plants, Industrial wastes, *Waste water treatment, *Filtration.
Identifiers: *Biofiltration.

The Dow Chemical Company, which produces glycol, glycerine, light hydrocarbons, styrene, ethylbenzene, and epoxy, has been using a pilot-scale study to investigate biofiltration as a means of waste water treatment. A special euryhaline variety of bacteria was developed to remove organics from saline waste streams. EPA regulations which required additional reductions in effluent suspended solids and BOD resulted in a pilot-scale study in which wastes from biological treatment are treated in a shallow pond where surface-feeding algae consume effluent bacteria. Brine shrimp then consume the algae, leaving a clear effluent for discharge via baffles and a weir to the Brazos River. The one-acre pilot plant includes two algae ponds and one brine shrimp pond. Brine shrimp eggs, the only waste product from the process, will be harvested and sold for fish feed. Calculated energy requirements for the brine shrimp plant are projected at 825 KWh/day or 0.007% of conventional system energy requirements. The process produces no solid waste, which for conventional treatment processes was projected at 1500 lb/day. (Schulz-FIRL)
W78-01264

EFFLUENT PURIFICATION IN THE PURIFICATION PLANT OF THE BADISCHE ANILIN AND SODA FABRIK (BASF) IN LUDWIGSHAFEN (ABWASSERREINIGUNG IN DER KLAERANLAGE DES WERKES LUDWIGSHAFEN DER BASF AKTIENGESELLSCHAFT),
H. Engelhardt, W. Geiger, W. Haltrich, and W. Weisbrodt.
Vom Wasser, Vol 47, p 141-153, 1977. 4 fig, 4 tab, 7 ref.

Descriptors: *Chemical wastes, *Denitrification, *Municipal wastes, *Neutralization, *Settling basins, Aeration, Biochemical oxygen demand, Water pollution control, Industrial wastes, *Waste water treatment.
Identifiers: Ludwigshafen(Germany).

Waste water treatment processes used at the BASF chemical production complex in Ludwigshafen, Germany, are described. A mechanical/biological treatment plant has been used since 1974 to treat the 500,000 cu m/day of waste water from the city of Ludwigshafen. The quantity of BOD entering the plant daily is 350 tons from the industrial complex and 18 tons in the form of municipal waste. Influent waste waters are neutralized before coarse solids are removed in settling basins. Controlled denitrification is accomplished in 300,000-cu-m aeration basins. During 1975 treatment processing reduced influent BOD by 95%, organic carbon by 78%, and nitrate by 72%. (Schulz-FIRL)
W78-01265

CHEMICO-BIOLOGICAL INTERACTIONS IN BIOLOGICAL PURIFICATION SYSTEM, I. GROWTH INHIBITION EFFECT OF AZO COMPOUNDS ON ACTIVATED SLUDGE MICROORGANISMS,
National Research Inst. for Pollution and Resources, Tokyo (Japan).
Y. Yonezawa, and Y. Urushigawa.
Bulletin of Environmental Contamination and Toxicology, Vol 17, No 2, p 208-213, February, 1977. 2 fig, 3 tab, 3 ref.

Descriptors: *Activated sludge, *Microorganisms, *Nitrogen compounds, *Organic wastes, *Chemical wastes, Sewage bacteria, Biological treatment, Sludge treatment, Industrial wastes, *Waste water treatment.
Identifiers: *Azocompounds, Activated sludge microorganisms.

Azobenzene, 4-aminoazobenzene, o-, and p-methyl red, and other azocompounds were used in laboratory investigations of the inhibition of growth of activated sludge microorganisms by Azocompounds, the degree of growth inibition was evaluated with respect to the azocompound concentration required to reduce the logarithmic phase growth rate constant by 50%. The turbidity of the culture at 660 nm was used to quantify the growth rate constant. Concentrations for 50% growth inhibtion are listed for 19 azocompounds. Strong growth inhibtion was observed for aminobenzenes with the exception of 4,4'-diaminoazobenzene and m-methyl red, while azobenzenesulfonic acids did not greatly inhibit microorganism growth. The relation of the 50% growth inhibtion concentrations of azobenzenes with their partition coefficients between octanol and water indicated that the growth inhibtion of azocompounds on activated sludge micro-organisms is dependent on the degree of cell permeability by the compound. (See also W78-01267) (Schulz-FIRL)
W78-01266

CHEMICO-BIOLOGICAL INTERACTIONS IN BIOLOGICAL PURIFICATION SYSTEM, II. BIODEGRADATION OF AZOCOMPOUNDS BY ACTIVATED SLUDGE,
National Research Inst. for Pollution and Resources, Tokyo (Japan).
Y. Urishigawa, and Y. Yonezawa.
Bulletin of Environmental Contamination and Toxicology, Vol 17, No 2, p 214-218, February, 1977. 1 fig, 1 tab, 5 ref.

Descriptors: *Chemical reactions, *Activated sludge, *Biodegradation, *Nitrogen compounds, *Chemical properties, Analytical techniques, Chemical wastes, Kinetics, Chemical analysis, *Waste water treatment.
Identifiers: Azocompounds.

Laboratory experiments were used to examine the biodegradation of azocompounds by activated sludge and the relationship between the biodegradability and molecular structure. Azocompound concentrations were measured in terms of UV absorbance to indicate the degree of primary biodegradation by simple cleavage. The biodegradation was observed as a first-order reaction, and the biodegradability of each compound was assessed in terms of its rate constant. Parameters given for each of the 31 compounds include observed wave length, type of reaction curve, induced period, rate constant, and percentage of degradation. Reaction curves were categorized according to decolorization without induced period, decolorization after some induced period, and decolorization proceeding to a limited extent. (See also W78-01266) (Schulz-FIRL)
W78-01267

WASTE WATER NITRIFICATION,
Du Pont de Nemours (E. I.) and Co., Charleston, SC.
H. I. Shade.
Chemical Engineering Progress, Vol 73, No 5, p 45-49, May, 1977. 6 fig, 3 tab.

Descriptors: *Nitrification, *Ammonia, *Activated sludge, *Aeration, *Biological treatment, Nitrogen fixing bacteria, Treatment facilities, Clarification, Nutrient removal, Design data, Industrial wastes, *Waste water treatment.

A single-stage, carbonaceous-nitrogenous activated sludge plant was put into operation by the Du Pont Company at one of its manufacturing facilities to reduce the total Kjeldahl nitrogen level of 300 mg/liter of effluent to less than 1 mg/liter. The system is also designed to reduced influent BOD of 2000 mg/liter and COD of 3000 mg/ liter by 99% and 96%, respectively. Plant design parameters,, chosen to satisfy the requirements of autotrophic nitrifying bacteria, are presented. During

the treatment process chemical feeds and recycled sludges are combined with the influent waste flow and passed through a splitter box to two parallel 750,000-gal aeration tanks. Mixed liquor from the aeration tanks passes to two 34-ft diameter clarifiers, and clarifier overflow is chlorinated prior to discharge. Sludge from the two clarifiers is combined and passed from an influent mix box to an aerobic digester with solids retention time of 26 days and a design digestion time of 43 days. A basket-type centrifuge is used to dewater the digested sludge to a solids concentration of 6%. Hexamethylene diamine, the principal process waste, and sodium acetate were used to supply nitrogen nutrient and COD loading during start-up. Nitrification was observed after 6 days of operation. Actual process waste streams were added after 67 days of operation. Increases in ammonia during the initial period of acclimation were attributed to the presence of organics in the waste stream, phosphate deficiency, high pH, decreases in aeration tank temperature, variations in flow, and high solids retention times. (Schulz-FIRL)
W78-01268

WASTE CITRUS ACTIVATED SLUDGE AS A POULTRY FEED INGREDIENT,
For primary bibliographic entry see Field 5E.
W78-01269

INDUSTRIAL WASTE AND PRETREATMENT IN THE BUFFALO MUNICIPAL SYSTEM.
McPhee, Smith, Rosenstein Engineers, Buffalo, NY.
EPA-600/2-77-018, January 1977. 184 p, 20 fig, 31 tab, 22 ref, 3 append.

Descriptors: *Industrial wastes, *Municipal wastes, *On-site data collections, *Activated sludge, Sludge treatment, Sludge disposal, Costs, Sewerage, Surveys, Taxes, *Waste water treatment, *New York, *Biological treatment.
Identifiers: Buffalo(NY), Materials balance.

Since the Buffalo, New York, municipal waste water treatment system handles 170 mgd of combined municipal and industrial wastes, a program was initiated to establish an industrial waste control program, revise existing sewer use regulations, establish a cost recovery and user charge system, and examine the effects of regulations on industrial discharges to the Buffalo sewerage system. The study included an industrial waste survey to examine the nature, source, and quantity of waste water produced by the area's industries. A materials balance of wastes contributed by domestic and industrial sources, infiltration and river inflow, storm water, and the Scajaquada Creek was developed with respect to BOD, COD, TSS, As, Cd, Cr, Cu, CN, Pb, Hg, Ni, Zn, and flow. The data obtained in the survey were used to develop an industrial waste control program which included a permit system and a monitoring program. The cost recovery and user charges levied according to the waste strength and volume. A 95,000 liter/day pilot-scale activated sludge plant was used to examine the effects of industrial wastes on biological treatment processes. (Schulz-FIRL)
W78-01270

UTILIZATION OF PULP AND PAPER INDUSTRY WASTES (UTILIZATSIYA OTKHODOV TSELLYULOZNO-BUMAZHNOGO PROIZVODSTVA),
Tsentralnyi Nauchno-Issledovatelskii Inst. Bumagi, Moscow USSR.
G. G. Bratchikov, M. D. Babushkina, L. A. Oni, and A. I. Gol'bert.
Promyshlennaya Energetika, No. 10, p 9-11, 1976. 1 fig.

Descriptors: *Pulp wastes, *Water pollution control, *Treatment facilities, Incineration, Wastes, Industrial wastes, Sulfite liquors, Foreign countries, Burning, Boilers, Air pollution, Pulp and paper mills, Effluents, *Waste water treatment, Pollution abatement.
Identifiers: *Sulfite pulp mills, Heat recovery, Chemical recovery, Spent sulfite liquor, USSR.

An installation for the recovery of heat and chemicals from magnesium-base spent sulfite liquor and for the consequent abatement of water and air pollution has been put into operation at the Krasnoyarsk (USSR) pulp and paper mill. The plant is equipped with two boilers in which a mixture of spent sulfite liquor from the production of semichemical and chemical magnesium-base pulp is burned at 1100-1300 C. Each boiler has a precombustion chamber in which mazout is burned, the flue gases being directed into the combustion chamber of the boiler. The flue gases from the boiler pass through an economizer, and MgO is separated in cyclones, while the gases are purified in venturi absorbers and scrubbers. The spent sulfite liquor recovery system is described and illustrated. Each recovery boiler burns 13-15 tons/hr evaporated liquor (55% solids) and 0.4-0.6 tons/hr mazout, producing 21-23 Gcal/hr and 70-90 cu m/hr bisulfite solution. The recovery of sulfur is 98%. (Stapinski-IPC)
W78-01271

PRELIMINARY RESULTS WITH A PILOT-PLANT WASTE RECYCLING-MARINE AQUACULTURE SYSTEM,
Woods Hole Oceanographic Institution, MA.
J. H. Ryther.
In: Wastewater Renovation and Reuse, F.M. D'Itri (ed.), Marcel Dekker, Inc., New York, Chapter 4, p 89-132. 1976. 1 fig, 5 tab, 7 ref. Also as: Woods Hole Oceanographic Institution Contribution No. 3762. NOAA-SG-04-4-158-5, 04-5-158-8, NSF-GI-43884.

Descriptors: *Aquaculture, *Sewage treatment, *Nutrients, *Recycling, *Waste water treatment, *Tertiary treatment, Shellfish, Biological treatment.

A biological, tertiary sewage treatment-marine aquaculture system has been developed, tested, and evaluated over one year on a 'pilot-plant' scale at the Environmental Systems Laboratory (ESL) of the Woods Hole Oceanographic Institution. The effluent from secondary sewage treatment, mixed with seawater, is used as a source of nutrients to grow single-celled marine algae in mass, continuous flow-through cultures. Algal cultures diluted with seawater are fed into cement raceways containing stacked trays of shellfish. The trays were stocked with the American oyster (Crassostrea virginia) and the hard clam (Mercenaria mercenaria) as well as smaller numbers of other shellfish species. The phytoplankton remove the nutrients from sewage effluent which has varied experimentally from 10-50% of the effluent-seawater mixture. The shellfish remove the phytoplankton from the water. Prior to its discharge, the effluent from the shellfish cultures is passed through seaweeds grown in suspended culture to remove nutrients not initally assimilated by phytoplankton and excretion from the shellfish. (NOAA)
W78-01277

METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO, DES PLAINES, O'HARE CONVEYANCE SYSTEM.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 498, Price codes: A10 in paper copy, A01 in microfiche. 1975. 218 p, 17 ref, 19 fig, 5 tab, 7 append.

Descriptors: *Environmental effects, *Sewerage, *Construction, *Sewers, Geology, Soils, Biology, Water quality management, Combined sewers, Tunnels, *Sewage treatment, Benefits, *Waste water treatment.
Identifiers: Chicago(IL), *Environmental impact statement.

An environmental impact statement is presented for a proposed project to construct a system of conveyance tunnels or interceptor sewers and drop shafts to transport waste water from a 65.2-sq-mi area in the Metropolitan Sanitary District of Greater Chicago to the O'Hare Water Reclamation Plant. The report includes detailed descriptions of the present environment, covering such topics as climate, topography, geology, soils, hydrology, biology, air quality, land use, sensitive areas, population projections and economic forecasts, and other programs in the area. Project objectives, constraints, chronology of plans and studies, and alternatives to the proposed project are discussed. Aspects of the proposed project which are described include the main tunnel, branch tunnels, sequencing of tunnel construction, main shaft, drop shafts, and access manholes. The environmental effects of the proposed project are described. Federal/state agency comments and public participation are discussed. (Schulz-FIRL)
W78-01280

NEED TO CONTROL DISCHARGES FROM SEWERS CARRYING BOTH SEWAGE AND STORM RUNOFF (RPT. TO THE CONGRESS).
Comptroller General of the United States, Washington, D.C.
For primary bibliographic entry see Field 5G.
W78-01281

REPORT ON EVALUATION OF WASTE SOURCES IN THE MEMPHIS, TENNESSEE AREA.
National Field Investigations Center-Denver, CO.
For primary bibliographic entry see Field 5B.
W78-01282

REPORT ON WATER QUALITY AND WASTE-SOURCE INVESTIGATIONS-MISSOURI RIVER AND PAPILLION CREEK, OMAHA, NEBRASKA.
National Field Investigations Center-Denver, CO.
For primary bibliographic entry see Field 5B.
W78-01283

RUNOFF AND EROSION CHARACTERISTICS OF SURFACE-MINED SITES IN WESTERN NORTH DAKOTA,
North Dakota State Univ., Fargo. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 2J.
W78-01298

SILICATE SCALE CONTROL IN GEOTHERMAL BRINES,
Occidental Research Corp., La Verne, CA.
For primary bibliographic entry see Field 3A.
W78-01316

EDGED AND FILL MATERIALS ARE ALSO COVERED. THE WATER RESOURCES RESEARCH SECTION PRESENTS OPTIONS FOR ALLEVIATING PROBLEMS CAUSED BY FRAGMENTED RESEARCH. THE FINAL SECTION PRESENTS OPTIONS FOR ESTABLISHING PROCEDURES TO QUANTIFY THE AMOUNT OF 'SURPLUS' WATER SUBJECT TO STATE APPROPRIATION UNDER THE FEDERAL RESERVED WATER RIGHTS DOCTRINE IN ORDER TO PREVENT USING COSTLY AND TIME-CONSUMING LITIGATION TO DETERMINE THE RESPECTIVE RIGHTS OF COMPETING SOVEREIGNS UNDER THE DOCTRINE. (SPECTOR-FLORIDA)
Federal Water Pollution Control Act of 1972. The EPA focus will be on controlling toxic pollutants and encouraging conservation, reuse and recycling of water and the elements currently being discharged in waste water. The strategy for meeting these objectives in both municipal and industri-

al areas are explained. The programs for control of non-point source pollution and regualtion of discharge of
For primary bibliographic entry see Field 5G.
ncil has published supplemental information on wa

APPLICATION OF OXYGEN TO TREAT WASTE FROM MILITARY FIELD INSTALLATIONS,
Texas Univ. at Austin. Dept. of Civil Engineering.
J. F. Malina, Jr.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A027 033, Price codes: A05 in paper copy, A01 in microfiche. Technical Report CRWR-99, EHE-73-02, 1973. 77 p, 9 fig, 14 tab, 45 ref, append. Prepared for Army Medical Research and Development Command, Washington, D.C.

Descriptors: *Aeration, *Oxygenation, *Oxidation lagoons, *Aerated lagoons, *Disinfection, Viruses, Bacteria, Biochemical oxygen demand, Sewage treatment, Sludge treatment, Model studies, *Waste water treatment.
Identifiers: Military installations.

Objectives of this program were to study the survival of enteric viruses and bacteria in stabilization ponds with high purity oxygen systems, and to examine the feasibility of using high purity oxygen in military installation field treatment facilities. The four laboratory-scale pond systems used in the study include a stabilization pond which was preceded by a mixed oxygenated lagoon, one which was preceded by an oxygen contact chamber, one in which oxygen was added to the first bay of the four-bay basin, and one to which oxygen was not introduced. Measurements of BOD, COD, total organic carbon (TOC), total oxygen demand (TOD), suspended solids, total coliform, fecal streptococcus, bacteriophage, and enteric animal viruses were used to evaluate pond performance. The system containing the oxygenated lagoon achieved the best results on the basis of virus and bacteria inactivation. Performance data for each of the systems is presented. At a loading rate of 250 lb BOD/acre per day, the simple stabilization pond was capable of removing 97.7% of BOD, 92.6% of COD, 84.2% of TOD, and 80% of TOC. Enteric virus and bacteria inactivation range from 88% to 94%, and bacteria reduction was in excess of 98%. When high purity oxygen was added, BOD, COD, TOD, and TOC removals were 98.6%, 94.6%, 89%, and 90%, respectively. (Schulz-FIRL)
W78-01402

UPGRADING EXISTING WASTEWATER TREATMENT PLANTS. PRE-PLANT CONSIDERATIONS,
Johnson and Anderson, Inc., Pontiac, MI.
J. G. Meenahan.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-258 811, Price codes: A02 in paper copy, A01 in microfiche. Report to EPA, Cincinnati, Ohio, Office of Technology Transfer, November 1972. 11 p, 6 fig.

Descriptors: *Treatment facilities, *Evaluation, *Design, *Storage tanks, *Equalizing reservoirs, Sewage treatment, Water quality standards, *Waste water treatment.

Because changing federal and state water quality standards may require waste water treatment plant operators to modify facilities to produce higher quality effluents, a discussion of pre-plant options in upgrading a facility is presented. Topics examined include: reasons for upgrading, collection systems, waste water flow measurement, definitions of waste water flow, flow equalization as a means of extending plant capacity, and necessary steps in the evaluation of existing facilities. Appendices to the report include an illustration of diurnal flow variation, population and flow projections, and process diagrams for an existing and a proposed plant. (Schulz-FIRL)
W78-01403

ALASKAN INDUSTRY EXPERIENCE IN ARCTIC SEWAGE TREATMENT,
Corvallis Environmental Research Lab., College, AK. Arctic Environmental Research Station.
S. E. Clark, A. J. Alter, J. W. Scribner, H. J. Coutts, and C. D. Christianson.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 585, Price codes: A03 in paper copy, A01 in microfiche. Working Paper-13, May, 1971. 32 p, 17 fig, 7 tab, 6 ref.

Descriptors: *Alaska, *Sewage treatment, *Aeration, *Construction, *Arctic, Oxidation, Lagoons, Treatment facilities, Biochemical oxygen demand, Sewage disposal, *Waste water treatment.
Identifiers: North Slope(AK), Prudhoe Bay(AK).

Limitations on water supply and waste disposal practices on Alaska's North Slope have prefaced this examination of two advanced physical-chemical treatment systems, extended aeration facilities, and other types of waste treatment facilities. Constructed to provide sewage treatment for Alaskan pipeline construction camps, the physical-chemical plants include alum flocculation, upflow clarifiction, first stage downflow carbon adsorption-filtration, second stage upflow carbon adsorption, and chlorination. Provisions are made for separation and treatment of waste water according to origin (toilet versus other sources). Raw sewage characteristics are provided for five North Slope facilities, and effluent characteristics are provided for seven North Slope facilities. Average water usage and household sewage distribution tables are presented. (Schulz-FIRL)
W78-01404

THE RECLAMATION OF DRINKING WATER FROM SEWAGE,
Asian Inst. of Tech., Bangkok (Thailand).
M. G. McGarry.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A008 453, Price codes: A04 in paper copy, A01 in microfiche. Technical Report FE-472-2, Army R&D Group (Far East), February 1975. 75 p, 20 ref, 16 fig, 5 tab.

Descriptors: *Return flow, *Potable water, *Tertiary treatment, *Filtration, *Activated carbon, Disinfection, Water treatment, Chlorination, Water resources development, Algae, Nutrient removal, Nitrogen, Chemical oxygen demand, *Water treatment.
Identifiers: *Thailand.

Various aspects related to the direcrt reclamation of waste water for drinking are discussed. Practices in Thailand which involve the photosynthetic recovery and harvest of nitrogen in the form of algal protein and the removal of low level organics by burnt rice husk media filtration are described. Varieties of roughing filtration are examined. Pilot studies on photosynthetic stripping of nitrogen from clarified high rate pond effluent are described. Experiments dealing with powdered activated carbon adsorption were conducted to examine starting material, chemical treatment methods, and particle size. Dual media and semi-rapid filtration are discussed for application to local filter media materials in Thailand. Results of experiments on organic and ammonia nitrogen removal by breakpoint chlorination are given. Design configurations to integrate unit processes into continuous flow systems for renovation of domestic waste water are evaluated. (Schulz-FIRL)
W78-01406

CENTRAL KITSAP COUNTY WASTEWATER FACILITIES, (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 511, Price codes: A21 in paper copy, A01 in microfiche. Report EPA-910/9-75-012, May 1976. 466 p, 22 fig, 37 tab, 72 ref, 10 append.

Descriptors: *Environmental effects, *Sewerage, *Outfalls, *Treatment, *Hydrology, Erosion control, Watershed management, Sewers, *Waste water treatment, Waste water disposal, Sanitary landfills, Sewage treatment.
Identifiers: Kitsap County(WA).

The final environmental impact statement for a proposed $18 million project to construct interceptor sewer lines, a waste water treatment facility, and a waste water disposal facility in Kitsap County, Washington, is presented. Eleven alternatives developed for the facilities plan are described. Detailed descriptions of the environmental setting and of the environmental impacts of the proposed project are given. Adverse impacts and mitigative measures are described. Design flows and other data are presented for the project. Major recommendations for the project include: revegetation and tunnelling to prevent erosion of shoreline bluffs at outfall sites; porous backfilling for the sewerage system; and a comprehensive metering study for outfall diffuser design. (Schulz-FIRL)
W78-01407

DESIGNING TO REMOVE PHOSPHORUS BY USING METAL SALTS AND POLYMERS IN CONVENTIONAL PLANTS,
Shimek, Roming, Jacobs, and Finklea, Dallas, TX.
J. E. Laughlin.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 376, Price codes: A03 in paper copy, A01 in microfiche. EPA Report, Seattle, Washington, December 1971. 12 fig, 35 ref.

Descriptors: *Phosphorus, *Coagulation, *Flocculation, *Salts, *Polymers, Design criteria, Clarification, Sludge treatment, Sludge disposal, Chemical degradation, Nutrient removal, Chemical precipitation, Separation techniques, *Waste water treatment, Sewage treatment.
Identifiers: Phosphorus removal.

A report on treatment design to remove phosphorus from waste water was presented as part of the EPA-sponsored 'Design Seminar for Wastewater Treatment Facilities' which was held in Seattle, Washington, on December 1-2, 1971. Metal salts and polymers used in conventional waste water treatment plants, including FeCl3, pickle liquor, alum, and sodium aluminate, are evaluated. Topics discussed include: phosphorus removal needs, process variations, pilot studies, chemicals, hardware, dosage selection and control, polymers, coagulants, sludge harvesting and disposal, supernatant characteristics, and costs. Flash mixing, flocculation, chemical injection, feeding equipment, piping, and storage tanks are discussed with respect to design data, use, and efficiency. Chemical and capital investment costs are presented. (Schulz-FIRL)
W78-01408

EVALUATION OF SEWAGE TREATMENT FACILITIES, SAN FRANCISCO, CALIFORNIA, SEPTEMBER 1975.
National Enforcement Investigations Center, Denver, CO.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-258 401, Price codes: A07 in paper copy, A01 in microfiche. Report EPA/330/2-75/008, October, 1975. 135 p, 18 fig, 28 fig, 13 ref, 3 append.

Descriptors: *Environmental effects, *Bioassay, *Treatment facilities, *Toxicity, *Environmental

sanitation, Outfalls, Waste water disposal, Saline water fish, Benthic fauna, Oysters, Operation and maintenance, On-site data collections, Surveys, *Sewage treatment, *Waste water treatment, California.
Identifiers: *San Francisco(CA), Threespine stickleback.

Sewage treatment facilities in San Francisco, California, were evaluated in 1975 to determine discharge limitations of the North Point, Richmond-Sunset, and Southeast waste water treatment plants. Additional objectives were to determine whether waste discharges posed hazards to San Francisco Bay and the Pacific Ocean, and to evaluate interim water pollution control measures. The studies included in-plant and receiving-water surveys at each of the facilities. Design data for each of the three facilities is presented. Physical-chemical characteristics, bacteriological characteristics, and toxicity response of the threespine stickleback were measured for plant effluent and receiving waters. Operation and efficiency of each plant was examined. Studies were conducted at outfall locations to determine the effect of effluents on oyster survival and propagation and to examine benthic conditions. Appendices to the report include presentations of survey results, methods used in the survey, and chain of custody procedures. (Schulz-FIRL)
W78-01409

ADVANCED TECHNIQUES FOR INCINERATION OF MUNICIPAL SOLID WASTES,
Environmental Protection Agency, Washington, DC. Office of Solid Waste Management Programs.
For primary bibliographic entry see Field 5E.
W78-01410

ECONOMIC OPTIMIZATION OF RELIEF SEWER DESIGN,
Florida Univ., Gainesville, Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W78-01411

INNOVATIVE SOLUTION TO STORM WATER MANAGEMENT PROBLEM.
For primary bibliographic entry see Field 5G.
W78-01413

SEWER PROBLEM BECOMES ASSET.
For primary bibliographic entry see Field 5G.
W78-01414

SEAMLESS PIPE FOR SANITARY, STORM SEWERS.
For primary bibliographic entry see Field 8B.
W78-01415

SLAG AND QUARRY WASTE AS PIPE BEDDING MATERIAL,
Bokaro Steel Ltd. (India).
For primary bibliographic entry see Field 8D.
W78-01416

SWAMPY SEWER JOB MOVES WITH BIG BACKHOES.
For primary bibliographic entry see Field 8C.
W78-01417

FLOWMETER MOUNTINGS SOLVE PROBLEMS IN MUNICIPAL I AND I STUDY,
For primary bibliographic entry see Field 7B.
W78-01419

CITY FIGHTS GREASE AND ODOR PROBLEMS IN SEWER SYSTEM.
For primary bibliographic entry see Field 5G.
W78-01420

PIPEWORK IN RIVER OR SEA ENVIRONMENTS.
For primary bibliographic entry see Field 8B.
W78-01422

ECONOMY IN CONSTRUCTION OF SEWERAGE SYSTEM,
Bokaro Steel Ltd. (India).
For primary bibliographic entry see Field 8B.
W78-01423

DIGGING BEFORE PILE DRIVING SPEEDS HULL SEWER JOB.
For primary bibliographic entry see Field 8D.
W78-01424

'PIGGY-BACK' SEWER SOLVES OVERLOAD PROBLEM,
Shafer, Kline and Warren, Kansas City, Mo.
For primary bibliographic entry see Field 8B.
W78-01425

ACTIVATED SLUDGE TREATMENT OF PHOSPHATE-CONTAINING AQUEOUS EFFLUENT - WITH PRIMARY ANAEROBIC STAGE AND SECONDARY AEROBIC STAGE TO PREVENT FORMATION OF THREAD-LIKE MICROORGANISMS.
Belgian Patent BE-853-318. Issued August 1, 1977. Derwent Belgian Patents Abstracts, Vol. Y, No. 32, p 97, September, 1977.

Descriptors: *Microorganisms, *Activated sludge, *Oxygenation, *Biochemical oxygen demand, *Patents, Aeration, Settling basins, Sludge treatment, Aerobic treatment, Anaerobic conditions, Phosphates, *Waste water treatment.
Identifiers: Filamentous microorganisms.

A process for inhibiting the growth of filamentous microorganisms during the activated sludge process has been patented. The circulating activated sludge is mixed with a BOD-containing aqueous effluent. Anaerobic conditions with less than 0.7 ppm dissolved oxygen and virtually no nitrogen oxides are maintained to promote absorption of BOD by non-filamentous microorganisms. The mixed liquor is then aerated in an oxygenation zone with a dissolved oxygen concentration of greater than 1 ppm to remove the BOD. A settling zone is employed to separate the purified supernatant from the oxygenated mixed liquor. Part of the settled sludge is returned to the mixing zone for further treatment. The treatment process is reported to result in improved sludge settling characteristics and the elimination of bound phosphates in the effluent water. (Schulz-FIRL)
W78-01426

SEWAGE PURIFICATION PROCESS.
German Patent DS 1642-509. Issued August 11, 1977. Derwent German Patents Abstracts, Vol. Y, No. 33, p 47, September, 1977.

Descriptors: *Sludge treatment, *Ammonia, *Anaerobic conditions, *Patents, *Chemical oxygen demand, Effluents, Heat transfer, Heat treatment, Equipment, *Waste water treatment.

A waste water purification process to reduce the COD of sludge by wet oxidation has been patented. Partial wet oxidation with excess gaseous oxygen reduces the COD by 10-45%. The solids are separated from the mixed liquor, which contains ammonia nitrogen, and cooled to 75-108C. A portion of the effluent is then returned to sludge tank to create temperature conditions of 30-60C and an ammonia nitrogen content of less than 1.0 g/liter. The treatment equipment should be arranged so that the sludge tank is connected to a settling tank and to a heat exchanger-wet combustion reactor unit. Provisions should be made to maintain anaerobic conditions in the sludge tank in spite of the influent waste water characteristics. (Schulz-FIRL)
W78-01427

SUSPENSIONS SLUDGE GRAVITY SEPARATOR-WITH STABILITY INCREASED BY VERTICAL MOVEMENT MECHANISM OF FILTER ELEMENTS.
Soviet Patent SU-391-837. Issued November 14, 1973. Soviet Inventions Illustrated, Vol. Y, No. 3, p D1, August, 1977.

Descriptors: *Dewatering, *Separation techniques, *Sludge treatment, *Patents, *Suspended solids, Flocculation, Coagulation, Equipment, *Waste water treatment.
Identifiers: *Gravity sludge separators.

A cylindrical-control device for the gravity separation of suspensions, including sludge, has been patented. The gravity separator, with pipes and filter elements on top of its casing, is vertically moveable by means of a pair of screw elements. The casing is filled with a mixture of coagulant, flocculator, and waste water and is equipped with a filtration pipe, a turbidity gauge, and a sludge level control device. The sludge level is maintained so that the optimum high suspension zone is in the region of the filter elements. The turbidity gauge activates the reversing drive of the vertical movement mechanism via a signal amplifier. (Schulz-FIRL)
W78-01428

ANAEROBIC PROCESSING OF BIOCHEMICAL WASTE - FORMING LOW MOLECULAR WEIGHT MATERIAL AND VOLATILE ACIDS, THEN DIGESTING RESIDUE FORMING METHANE.
French Patent FR 2324-581. Issued May 20, 1977. Derwent French Patents Abstracts, Vol Y, No 25, p D6, August, 1977.

Descriptors: *Anaerobic digestion, *Chemical wastes, *Organic wastes, *Patents, *Methane, Organic compounds, Sludge treatment, Organic acids, Separation techniques, Carbon dioxide, *Waste water treatment.
Identifiers: Biochemical wastes.

An anaerobic treatment process which breaks down high molecular weight organic compounds into low molecular weight compounds, and low molecular weight organic compounds into volatile organic acids, has been patented. Biochemical wastes are initially processed in the presence of acid. After treatment and separation, methane and carbon dioxide are produced in a digester from the non-decomposed sludge fraction. The remainder is recycled through the initial treatment stage. Processing, separation, and digestion are then repeated. (Schulz-FIRL)
W78-01429

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ional beneficial side effects of the grease removal program included easier servicing of submersible pumps and reduction of odors. (Schulz-FIRL)
or the plant. McIntyre and Associates, consultin

HIGH PURITY WATER TREATMENT PERFORMS WELL AT EUROPE'S FIRST PLANT.
Materials Handling News, No. 236, p. 3, July, 1977.

Descriptors: *Oxygenation, *Aeration, *Organic wastes, *Oxidation, Equipment, Sewage treatment, Industrial wastes, Biochemical oxygen demand, Waste water treatment, *Treatment facilities.
Identifiers: Palmersford(UK).

A high purity oxygenation system, the Union Carbide Wimpey UNOX Pressure Swing Adsorption Unit, has been installed at a waste water treatment plant in Palmersford, England. The system is being used to treat sewage and organic industrial sludges for a population of up to 24,000 while taking up only half the space of a conventional filtration plant. Pure oxygen is fed to the system at the first stage. Compressed, cooled, dewatered air is passed to molecular sieves. BOD is reduced to 20 ppm in the first stage and to a final concentration of 10 ppm after ammonia is removed in the second stage. Constant pressure monitoring and a standby liquid oxygen supply are provided for the aeration tanks. The 90% oxygen supplied to the tank results in higher treatment efficiency and shorter required retention times. The UNOX system is suggested for use in any facility in which organic wastes are treated. (Schulz-FIRL)
W78-01431

SEWAGE WORKS FOR TEL AVIV.
Water and Waste Treatment, Vol. 20, No. 7, p 11, July, 1977.

Descriptors: *Aeration, *Treatment facilities, *Sewage treatment, *Return flow, *Waste water disposal, Water utilization, Waste water treatment.
Identifiers: *Tel Aviv(Israel), Rishon le Zion(Israel).

An IL 1,042, million sewage treatment plant has been planned for the greater Tel Aviv area in Israel as an alternative to the current practice of ocean dumping. Cooperative settlements in the southern desert area will use the effluent produced by th proposed facility, located at Rishon le Zion, for agricultural purposes. Mechanical aeration will be used at the facility to provide an effluent which will be applied to non-food crops. The facility will serve a population of 1 million, and will treat 100 million cu m of water per year, or about 10% of Israel's annual water consumption. (Schulz-FIRL)
W78-01432

SAFER, CLEANER HANDLING OF SEWAGE PUMPS.
For primary bibliographic entry see Field 8C.
W78-01433

A TURN FOR THE BETTER.
For primary bibliographic entry see Field 5G.
W78-01434

NEW DEVELOPMENTS IN FILTRATION,
Imperial Coll. of Science and Technology, London (England). Dept. of Public Health Engineering.
G. T. Fox, and T. D. Lekkas.
Water Services, Vol 81, No 978, p 460, 462, August, 1977. 1 fig.

Descriptors: *Filtration, *Filters, Porous media, Sands, *Sediment transport, *Settling basins, Particle size, Suspended solids, Flow friction, *Separation techniques, *Waste water treatment.
Identifiers: *Rapid sand filters, Multi-layer filters.

Recent research on the dynamics of rapid sand filtration is described. Studies were initiated to develop filtration technology which would allow waste water facilities to eliminate sedimentation before filtration. In order to provide efficient filtration, sand grains in the filter must be arranged so that larger particles are positioned at the top of the filter to remove large debris and smaller particles are at the bottom of the filter to remove smaller debris. However, when the filter bed is fluidized in operation, smaller grains migrate to the top and the efficiency of the filter is reduced. The mechanics of size grading in a sand filter are described and related to surface friction and particle size. Upflow filtration was developed to eliminate problems associated with gravity settling of larger particles. The multi-layer filter, containing anthracite/sand in a two-layer filter and polystyrene/anthracite/sand in a three-layer filter, incorporates the use of larger media which have a lower specific gravity than the smaller media. Head loss profiles are compared for the two types of filters. Proper orientations of the media in a multi-layer filter are maintained because of the density differences. Although more costly than sand filters, multi-layer filters can run up to 10 times longer than rapid sand filters. Research on the use of flexible plastic baffles or plastic sponge mesh for filtration is described. (Schulz-FIRL)
W78-01435

CENTRIFUGES CONCENTRATE SLUDGES.
Public Works, Vol 108, No 10, p 110, October, 1977.

Descriptors: *Dewatering, *Sludge treatment, *Centrifugation, *Activated sludge, *Lime, Tertiary treatment, Incineration, Calcium carbonate, Waste water treatment.
Identifiers: Durham(OR).

The United Sewerage Agency has installed three Dorr-Oliver Merco centrifuges at its waste water treatment facilities in Durham, Oregon. The centrifuges are used to thicken waste activated sludge and lime sludge. Centrifuge-thickened waste activated sludge and gravity-thickened primary sludge are combined prior to heat treating, dewatering, and incineration. The lime sludge which contains about 80% calcium carbonate is thickened before it is recalcined for recovery of the lime for reuse in the treatment process. In the operation of the disc-nozzle centrifuges, sludge enters the feedwell of a high speed rotor and passes to the impeller where it is brought up to rotor speed. Heavier particles are discharged to the underflow collector through nozzles at the periphery of the rotor. Clarified liquid travels up through the unit and is collected through an overflow discharge. (Schulz-FIRL)
W78-01436

WET AIR OXIDATION WORKS IN LOUISVILLE, KY.
Water and Wastes Engineering, Vol 14, No 9, p 54, September, 1977.

Descriptors: *Oxidation, *Incineration, *Organic wastes, *Industrial wastes, *Dewatering, Treatment facilities, Sewage treatment, *Waste water treatment.
Identifiers: Louisville(KY), Hexachlorocyclopentadiene, Octachlorocyclopentadiene, Hexachlorobenzene.

Four 250-gpm sludge oxidation units have been installed at the Morris Forman waste water treatment plant in Louisville, Kentucky. Tests conducted at Zimpro, Inc., in Rothschild, Wisconsin, for the EPA and Louisville Metropolitan Sewer District officials showed that low pressure wet air oxidation was capable of reducing concentrations of hexachlorocyclopentadiene and octachlorocyclopentadiene by 93%. Dewatering and incineration of the oxidized sludge in a multiple hearth furnace substantially reduced concentrations of hexachlorobenzene, another toxic chemical. Results of the studies were verified with 3500 gal of sludge shipped to Zimpro. Temperature, pressure, and aeration conditions employed in wet air oxidation destroy the two pentadienes in the first stage of treatment. A vacuum filter is then used to dewater the oxidized sludge to a solids content of 40%. Analyses of ash and stack gas produced during incineration of the dewatered sludge indicated that all three toxic chemicals were effectively destroyed during the processes. (Schulz-FIRL)
W78-01437

MICROSCREEN INNOVATION.
Filtration and Separation, Vol 14, No 4, p 412, July/August, 1977. 1 fig.

Descriptors: *Screens, *Filters, *Filtration, Equipment, *Tertiary treatment, Storm runoff, Sewage treatment, Water treatment, Waste water treatment.
Identifiers: *Microscreens, Rotary drum microscreens.

A series of rotary drum microscreens for water and sewage tertiary treatment is being produced by Paterson Candy International Ltd. of London, England. The microscreens may be used for storm water overflow treatment, final effluent polishing, BOD and turbidity removal, algae and plankton removal, and raw water straining. Available in standard diameter sizes of 1800, 2500, 3000, and 3700 mm and in lengths up to 5000 mm, the microscreen consists of a rotating open-ended horizontal drum supported on an A-frame. Raw waste water entering the drum's open end is filtered by the replaceable filter panels which are covered with screen mesh. Continuous spray, times-sequenced, and headloss monitoring systems optimize water usage for backwashing. (Schulz-FIRL)
W78-01438

PRODUCES HIGH SOLIDS CAKE FROM DILUTE SLUDGE.
Chemical Processing, Vol 40, No 10, p 53, September, 1977.

Descriptors: *Dewatering, Equipment, *Sludge treatment, *Filtration, *Flocculation, *Sewage treatment, High pressure, *Waste water treatment.
Identifiers: Sludge dewatering.

The Magnum dewatering press, which is produced by Parkson Corporation of Fort Lauderdale, Florida, is used to reduce the water content of sludges from waste water treatment. The dewatering process includes a draining stage, a low pressure stage, and a high pressure stage. Sludge which has been preflocculated with a polyelectrolyte is drained on a screen by light rolling and plowing. In the second stage, drained sludge on the screen is forced against a pressing screen by a series of decreasing diameter rollers, which gradually increase the pressure on the sludge. Very high pressure, created by 1 inch wide flat belts which press the sludge against a perforated roller, is used in the final stage of dewatering. The press is available in four widths, from 20 to 40 inches, and produces a filter cake with a much lower water content than that in cakes from a conventional belt filter press. (Schulz-FIRL)
W78-01439

ADVANCED WASTEWATER TREATMENT INCLUDES REVERSE OSMOSIS.
Public Works, Vol. 108, No. 9, p 166, September, 1977.

Descriptors: *Reverse osmosis, *Tertiary treatment, *Groundwater recharge, *Saline water intrusion, *Injection, Waste disposal wells, Water resources development, Return flow, Activated carbon, Filtration, Sewage treatment, *Waste water treatment.
Identifiers: Orange County(CA).

A water reclamation and groundwater injection project of the Orange County Water District in California is described. Water Factory 21, an advanced waste water treatment plant, provides injection water to prevent intrusion of sea water into the area's groundwater supply. The facility includes chemical clarification, ammonia stripping, recarbonation, multi-media filtration, carbon adsorption, chlorination, and a reverse-osmosis demineralization plant. The reverse osmosis system treats effluent from either the activated carbon columns of the mixed-media filters beds, to provide 85 gal of permeate for underground injection of every 100 gal of effluent treated. Treated effluent is pumped to a series of 23 multi-casing injection wells to prevent seawater intrusion and

augment Organge County's groundwater supply. (Schulz-FIRL)
W78-01440

SELF-CLEANING FILTER/SCREEN.
For primary bibliographic entry see Field 8G.
W78-01441

SYSTEM CONTROLS TREATMENT PLANT.
For primary bibliographic entry see Field 5G.
W78-01442

RETIRED MAYOR SPARKPLUGS SEWAGE TREATMENT CHANGE.
For primary bibliographic entry see Field 5E.
W78-01443

LAB TO TEST BULRUSHES AS FILTERS FOR SEWAGE.
For primary bibliographic entry see Field 5E.
W78-01444

EFFECTS OF SEVERAL OPERATIONAL PARAMETERS ON THE REMOVAL EFFICIENCY OF THE TOWER-TYPE PACKED BIOFILTER (JUTEN TOSHIKIRO SHO HO NI OKERU SEKKEI, UNTEN PARAMETA NO JOKA KORITSU NI OYOBOSU EIKYO),
Kyushu Univ., Fukuoka (Japan). Dept. of Food Science and Technology.
K. Yoshihara, M. Sambuichi, Y. Fujio, and S. Ueda.
Hakko Kogaku, Vol 55, No 3, p 122-128, 1977. 8 fig, 1 tab, 25 ref.

Descriptors: *Filters, *Trickling filters, *Chemical oxygen demand, *Packed beds, Separation techniques, Organic wastes, Model studies, Chemical wastes, *Waste water treatment.
Identifiers: *Biological filters.

The tower-type packed biofilter, a modified trickling filter filled with small rounded stones, was evaluated for COD removal in the treatment of organic waste water. The 1.5-m high biofilter was used to treat synthetic waste water which contained 0.17 kg COD/cu m/day. Waste water was recirculated through the filter at a rate of 600 ml/min to insure adequate maintenance of the biological film on the filter media. The tower-type filter was capable of removing 1.2-1.4 kg COD/cu m/day. Factors affecting COD removal efficiency for the tower-type filter were quantitatively similar to those affecting conventional trickling filters, including hydraulic loading, organic loading, filter depth, and forced ventilation of some gases. COD removal was inadequate at high hydraulic loading rates (36 cu m/sq m/day). Odor problems, attributed to inadequate aeration by natural-draft ventilation during the use of the filter, were alleviated when air or oxygen was supplied to the biofilter at 90 cu m/sq m/day. COD removal was not influenced by the dissolved oxygen concentration in the filter. (Schulz-FIRL)
W78-01445

STUDIES ON NITROGEN REMOVAL IN SEWAGE TREATMENT PLANTS (GESUISHORI SHISETSU NI OKERU CHISSOJOKYO NI KANSURU KENKYU),
K. Saito, K. Kobori, S. Ochi, and I. Yagihashi.
Kankocho Kogai Senmon Shiryo, (Report of Public Nuisance, Govt. and Public Office), Vol 12, No 3, p 49-61, 1977. 21 fig, 6 tab, 8 ref.

Descriptors: *Activated sludge, *Nitrification, *Nutrient removal, *Nitrogen fixing bacteria, Sea water, Organic wastes, Denitrification, Treatment facilities, Sewage treatment, *Waste water treatment.

Laboratory and field investigations examined the operating conditions for nitrification in the activated sludge process, defined operating parameters for effective nitrification and organic removal with existing treatment facilities, and evaluated recovery of organic carbon from anaerobic digester supernatant for use in denitrification. Laboratory-scale plug flow aerators were used to examine the effects of pH on nitrification with different substrates. The effects of salinity on nitrifying bacteria were examined at activated sludge plants. Field studies were conducted to examine seasonal variations of nitrifiers and to evaluate general performance of sewage treatment plants in Japan. The studies indicated that the optimum operating parameters for nitrification were a pH of 7-9 and an SRT of more than 10 days. Organic loadings less than 0.24 kg BOD/kg SS/day did not affect nitrification. The addition of alkalinity was necessary to oxidize TKN completely to nitrite or nitrate nitrogen. Growth of fresh water nitrifiers was inhibited under conditions of more than 40% seawater and was maximum when no seawater was added. With combined cultures of freshwater and seawater nitrifiers, maximum growth was observed with a total seawater media. It was suggested that seawater acted as a buffering agent. Field studies on Japanese sewage treatment plants indicated that nitrifiers were present at an average concentration of 1000-10,000 N/ml with Nitrobacter being more abundant than Nitrosomonas. Effective nitrification was observed at temperatures of 18-23C and at dissolved oxygen levels greater than 28% of saturation. (Schulz-FIRL)
W78-01446

CARBON-CHLORINE-CARBON SEWAGE TREATMENT,
Jet Propulsion Lab., Pasadena, CA.
R. H. Green, R. G. Howland, and C. J. Wallace.
NASA Tech Briefs, Vol 2, No 2, p 200, Summer, 1977. 1 fig.

Descriptors: *Activated carbon, *Chlorination, *Toxicity, *Adsorption, *Phenols, Organic compounds, Chemical wastes, Sewage treatment, *Waste water treatment.

Potential hazards posed by toxic and carcinogenic compounds produced by the reaction of chlorine with organics and other chemicals present in waste water treated by chlorination have led to the reevaluation of the use of chlorine as a disinfectant. An activated carbon treatment system was developed by Caltech/JPE and NASA with the cooperation of Orange County, California, to reduce potentially hazardous chlorinated substances in a combination carbon-chlorine-carbon treatment scheme. Activated carbon is generated at the treatment site through processing of sewage solids. Carbon is added to the primary sedimentation basin before chlorination and to the secondary clarifier after chlorination. The initial contact with carbon reduces the concentration of potentially hazardous substances which might react with chlorine, and the second carbon contact removes residual chlorine and chlorinated substances. Laboratory experiments were used to examine the ability of the proposed treatment scheme to remove phenols, aliphatic amines, aromatic amines, and polychlorinated biphenyls. Studies with final effluent from the waste water treatment plant in Orange County were used to verify the results. (Schulz-FIRL)
W78-01447

DESIGNING MORE ENERGY-EFFICIENT WASTEWATER TREATMENT PLANTS,
Missouri Univ., Columbia. Dept. of Civil Engineering.
S. K. Banerji, and J. T. O'Conner.
Civil Engineering-ASCE, Vol 47, No 7, p. 76-81, September, 1977. 4 fig, 6 tab, 19 ref.

Descriptors: *Treatment facilities, *Design criteria, Energy, *Pumps, *Sewage treatment, *Costs, *Fuels, Incineration, Filtration, Aerobic treatment, Anaerobic digestion, Return flow, Tertiary treatment, Electric power demand, Trickling filters, Separation techniques, Sludge treatment, Sludge disposal, *Waste water treatment.

Rising energy costs have made designs for energy-efficient waste water treatment systems attractive to plant operators and design engineers. Energy costs and typical energy requirements for waste water treatment processes are described. Power requirements are compared for secondary waste water treatment processes, including conventional activated sludge, rotating biological contractor, activated bio-filtration, and high rate trickling filtration. Energy consumption for tertiary and advanced waste water treatment processes is described. Energy requirements of land treatment of waste water with irrigation, infiltration/percolation, or overland flow are compared with those of advanced waste water treatment. Gravity thickening and anerobic digestion, which use less energy than flotation thickening and aerobic digestion, are suggested as means of sludge treatment. Performance data for various modes of sludge dewatering are compared. Refuse-derived fuel is discussed as an alternate fuel for sludge incineration. Waste water pump type and operating parameters are discussed with respect to power requirements. (Schulz-FIRL)
W78-01448

GRAIN SIZE DISTRIBUTION WITH DEPTH IN MULTILAYER GRANULAR BED WATER FILTERS,
Imperial Coll. of Science and Technology, London (England). Dept. of Public Health Engineering.
T. D. Lekkas, and G. T. J. Fox.
Filtration and Separation, Vol 14, No 5, p 461-462, 464, 466, 470, September-October, 1977. 10 fig, 11 tab, 6 ref.

Descriptors: *Filtration, *Stratification, *Particle size, *Particle shape, *Filters, Porous media, Coals, Settling velocity, Sediment sorting, Head loss, Hydraulic design, Model studies, Mathematical models, Separation techniques, *Waste water treatment.
Identifiers: Multi-layer filters, Anthracite, polystyrene.

Stratification during backwashing of granular filter beds reduces filter efficiency by producing beds with a smaller grain size at the top and a larger grain size at the bottom of the filter. The use of upflow filters and the use of larger but lighter grains have partially alleviated the problem of stratification. Pilot studies using a two-layer filter (anthracite and sand) and a three-layer filter (polystyrene, anthracite, and sand) were conducted to determine the distribution in grain size with depth. Stratification was not significant for sand, but was significant for anthracite in the two-layer filter and for polystyrene and anthracite in the three-layer filter. For the anthracite layer the grain size distribution is mathematically derived as a function of depth. Grain sphericity was measured according to mean sieve size, and according to count and weight equivalent grain size, to determine if shape stratification occurred within the anthracite layer in the two-layer filter. The studies indicated that some stratification did occur since sphericity increased with depth. Increasing the number of layers in a multilayer filter reduced the effects of size stratification on filter performance. (Schulz-FIRL)
W78-01450

PUTTING POWDERED CARBON IN WASTEWATER TREATMENT.
Environmental Science and Technology, Vol 11, No 9, p 854-855, September, 1977. 1 fig, 1 tab.

Descriptors: *Activated carbon, *Oxidation, *Tertiary treatment, Adsorption, Sewage treatment, Municipal wastes, Industrial wastes, Treatment facilities, Waste disposal, Costs, *Waste water treatment.
Identifiers: *Powdered activated carbon, Wet-air oxidation, Liverpool(OH), Vernon(CT).

A carbon/wet oxidation system, produced by Zimpro Inc. of Rothschild, Wisconsin, is described. Treatment with the Zimpro system includes adsorption on powdered activated carbon, conventional biological treatment, and regeneration of the spent carbon by wet air oxidation. The system is being used to upgrade the Liverpool Sewage Treatment Plant in Medina County, Ohio, from a conventional activated sludge facility to a 10-mgd advanced waste water treatment facility. The treatment is suggested as highly effective for industrial wastes or combined municipal-industrial wastes. Results of pilot studies to compare performance of the carbon/wet oxidation system with the conventional two-stage activated sludge system and to determine system nitrification, denitrification, oxygen transfer, and sludge characteristics are presented. Advantages of the system include: simultaneous adsorption of biodegradable and non-biodegradable wastes, high levels of nitrification due to long sludge age, and simultaneous destruction of biological solids and regeneration of spent carbon during wet air oxidation. Municipal and industrial waste treatment facilities currently using the Zimpro system of carbon/wet oxidation are listed. (Schulz-FIRL)
W78-01451

NEW 'PHILADELPHIA STORY' BEING WRITTEN BY POLLUTION CONTROL DIVISION,
Water Pollution Control Div., Philadelphia, PA.
M. D. Nelson, and C. F. Guarino.
Water and Wastes Engineering, Vol 14, No 9, p 22-26, 28, 38, September, 1977. 4 fig, 1 tab.

Descriptors: *Treatment facilities, *Activated sludge, *Combined sewers, *Storm runoff, *Monitoring, Pilot plants, Filters, Biological membranes, Sewage treatment, Sewerage, Automation, Sludge treatment, Waste water treatment.
Identifiers: Philadelphia(PA).

Additions in 1977 to the Southwest Water Pollution Control Plant, one of three which service Philadelphia, Pennsylvania, are described. The plant had been providing primary treatment for a waste water flow of 136 mgd with bar screens, grit channels, flocculation tanks, primary sedimentation tanks, and separate sludge treatment facilities. The expanded facility will provide treatment for an average flow of 210 mgd with provisions for expansion to 285 mgd. Additions to the plant include expanded and remodeled primary treatment facilities, oxygen activated sludge process facilities, and separate sludge treatment facilities to provide screening, grit removal, settling, biological treatment, and disinfection before treated effluent is discharged to the Delaware River. SURFACT, a rotating biological contractor which is submerged in a diffused air aeration tank, is being examined as a means of improving operating efficiency. Advantages of the fixed film contractor include process flexibility, lower susceptibility to upset, potential for both carbonaceous and nitrogenous removals in the same tank, the ability to use energy derived from the activated sludge system, and low capital and operating costs. Design criteria and costs for the prototype, a 20-mgd pilot-scale SURFACT system in operation at Philadelphia's Northeast treatment plant, are presented. (Schulz-FIRL)
W78-01452

REMOVAL OF ESCHERICHIA COLI IN WASTEWATER BY ACTIVATED SLUDGE,
Nijmegen Univ. (Netherlands). Dept. of Microbiology.
C. Van Der Drift, E. Van Seggelen, C. Stumm, W. Hol, and J. Tuinte.
Applied and Environmental Microbiology, Vol. 34, No. 3, p 315-319, September, 1977. 3 fig, 10 ref.

Descriptors: *Activated sludge, *E. coli, *Coliforms, *Sewage bacteria, *Microorganisms, Adsorption, Protozoa, Disinfection, Sludge treatment, Sewage treatment, *Waste water treatment.

A streptomycin-resistant strain of Escherichia coli was used in laboratory studies on the removal mechanisms of bacteria from waste water treated with activated sludge obtained at a municipal waste water treatment plant in Valburg, The Netherlands. The removal of E. coli by activated sludge is reported as a two-phase process with initial rapid removal and subsequent slower removal. The rapid decrease during the first hour after the addition of E. coli cells to mixed liquor was observed as following a Langmuir adsorption isotherm. Although the number of free E. coli decreased rapidly in the first hour, the total number of E. coli decreased at a much slower rate. Subsequent slower removal of E. coli was attributed to predation by ciliated protozoa as evidenced by the presence of fluorescent food vacuoles of ciliates when fluorescent E. coli cells were added to mixed liquor, by the inhibition of predation in the presence of cycloheximide or under anaerobic conditions, and by the absence of predation in bulking and washed sludge. (Schulz-FIRL)
W78-01454

MAKE PURE WATER OUT OF WASTE.
The American City and County, Vol. 92, No. 9, p 50, September, 1977.

Descriptors: *Water reuse, *Domestic wastes, *Treatment facilities, *Activated carbon, Equipment, Disinfection, Organic wastes, Ultraviolet radiation, Anaerobic digestion, Computers, Biological treatment, Water treatment, Waste water treatment.
Identifiers: *Domestic waste water recycling.

PureCycle, a computer-controlled module to recycle household waste water, is described. The system does not require water and sewer hookups and is composed of two 440-gal tanks and the processing system. The average treatment capacity of the system is 440 gpd with peak loading capacities of 800-1000 gpd. The processing system includes a biological reactor which uses disc rotation and a combination of aerobic and anaerobic digestion to oxidize organics. A pressurized filtration stage removes bacteria, viruses, and suspended particulates. Color, odors, and organic contaminants are removed by a carbon adsorption bed. Demineralization removes heavy metals and inorganic salts. Ultraviolet radiation is used to sterilize the recycled water. Processing is continuously monitored by a microcomputer. PureCycle of Boulder, Colorado, provides a service center to periodically remove solid organics and provide the initial 500 gal of water to start up the system. At current costs the break-even point is 200 PureCycle units per service center. Use of the system is suggested for areas with limited natural water supplies. (Schulz-FIRL)
W78-01455

COMPOST LATRINES IN TANZANIA: A PRELIMINARY REPORT,
Tanzania National Scientific Research Council, Dar es Salaam.
For primary bibliographic entry see Field 5E.
W78-01457

SLUDGE EXTRACTION WITH PNEUMATIC ASSISTANCE.
For primary bibliographic entry see Field 8C.
W78-01458

WHY NOT INCINERATE YOUR SCREENINGS,
For primary bibliographic entry see Field 5E.
W78-01459

A FUTURE FOR AUTOMATIC SLUDGE WITHDRAWAL,
C. W. Ching.
Water Services, Vol 81, No 978, p 505-506, August, 1977. 3 fig.

Descriptors: *Settling basins, *Sludge treatment, *Automation, *Viscosity, *Pumping, *Flow control, Valves, Equipment, Waste water treatment.
Identifiers: *Sludge withdrawal(Automatic), Sludge viscosity.

Ham, Baker, and Company Ltd., in conjunction with the Thames Water Authority of England, has produced a system for automatic sludge withdrawal from primary sedimentation tanks. The system can be automatically adjusted to initiate the desludging cycle at a preset time and to terminate sludge removal when the moisture content of the sludge being removed increases to a preset level. Sludge is removed from the sedimentation tank to an adjacent operating chamber. The viscosity of the sludge controls the velocity and level at which the sludge enters the operating chamber. Since the level in the control chamber will be related to the sludge moisture content, the inlet valve can be readily adjusted to close at a predetermined level. The automatic system eliminates the need for manual control and operator decisions. (Schulz-FIRL)
W78-01460

FLOW EQUALIZATION IS ON THE LEVEL,
Johnson and Anderson, Inc., Pontiac, MI.
G. W. Foess, J. G. Meenahan, and J. M. Harju.
Water and Wastes Engineering, Vol 14, No 9, p 96, 98, 100, 105-107, 134-135, September, 1977. 1 fig, 1 tab.

Descriptors: *Storage tanks, *Flow control, *Flow profiles, *Equalizing reservoirs, *Diurnal distribution, Treatment facilities, Tertiary treatment, Sewage treatment, Filtration, Effluents, Aeration, Design data, Municipal wastes, *Waste water treatment.
Identifiers: *Flow equalization, Walled Lake/Novi(MI).

Flow equalization as a means o leveling influent flow and concentration variations was evaluated at the 2.1-mgd Walled Lake/Novi waste water treatment plant in Michigan. Treatment at the tertiary facility uses the activated sludge process followed by multi-media tertiary filtration. Parameters measured during the 12-month evaluation period included BOD, total suspended solids, and total phosphorus under conditions of equalized and non-equalized flow. Influent waste water, primarily of domestic origin, is bar screened and then pumped from a wet well to the plant. The equalization basin used in the of municipal waste water treatment facilities. Photosynthetic ponds, aerated ponds, and complete retention ponds are the types of waste water ponds emphasized in this publication. Background information on the ability of flow-through photosynthetic ponds to meet secondary treatment requirements is presented. Various aspects of controlled discharge ponds which are designed to retain waste water on a long-term basis are discussed, including design criteria for ponds in operation and the selection of the optimum day and hour for the release of effluents. Criteria for the operation of complete-mix and partial-mix aerated ponds are given. General requirements are listed for positive disinfection, prevention of short circuiting, and protection of groundwater from pond seepage. Supplemental treatment methods for flow-through photosynthetic ponds are described, including conversion to controlled discharge, intermittent sand filtration, land treatment of pond effluents, addition of supplemental aeration, and chemical coagulation. (Schulz-FIRL)
W78-01465

HIGH-PRESSURE, THIN-CAKE, STAGED FILTRATION,
Artisan Industries Inc., Waltham, MA.
A. Bagdasarian, F. M. Tiller, and J. Donovan.
Filtration and Separation, Vol 14, No 5, p 455-458, 460, September-October, 1977. 8 fig, 16 ref.

Descriptors: *Filtration, *Dewatering, *Sludge treatment, *Sewage treatment, Equipment, Operation and maintenance, Turbines, Separation techniques, *Waste water treatment.
Identifiers: Sludge dewatering, Thin cake filtration, Continuous staged filtration.

Continuous, high pressure, thin-cake, staged filtration can be used in the post-treatment phase to dewater sludge. Alternate rotating and stationary filter elements are included in staged filters with rotating turbines. Sludge cake formation is inhibited by an induced drag on the stationary elements while the slurry is dewatered. Torque on the rotating turbine shaft during the last stage of filtration produces a shearing action which maintains the fluidity of the filtered solids. The final cake is continuously extruded. Higher filtration rates and lower porosites (higher sludge solids content) are produced with continuous staged filtration than with conventional pressure or vacuum filtration. The mechanism of thin cake filtration, the effects of flow rate per unit area, and washing methods are described. (Schulz-FIRL)
W78-01466

WASTEWATER REUSE BY THE TRUCKLOAD.
The American City and County, Vol 92, No 9, p 40, September, 1977.

Descriptors: *Water reuse, *Return flow, *Costs, *Water resources, *Sewage treatment, Irrigation practices, Water utilization, Treatment facilities, Water conservation, Waste water treatment.
Identifiers: Oakland(CA).

The East Bay Municipal Utility District (EBMUD) of Oakland, California, has implemented a waste water reclamation project in an effort to preserve existing water supplies. Secondary treated waste water is trucked to approved customers and designated for limited use in non-residential irrigation, sewer flushing, compaction of building sites, and dust control at landfills. Waste water reclamation is currently being practiced by the San Pablo Sanitary District, Central Contra Costa Sanitary District, Ora Loma Sanitary District, and the city of San Leandro. Costs for transportation, administration, and construction will eventually be apportioned to users. Initial costs to install pumps, hook up lines or hoses to the effluent pond, and discharge effluent to trucks are $2000-3000. Current costs for reclaimed waste water are about $20/1000 gal, as compared to $0.50/1000 gal for water from conventional sources. (Schulz-FIRL)
W78-01467

OXYGEN TRANSFER TESTS PROVE EFFICIENCY OF FINE BUBBLE DIFFUSER,
Wisconsin Univ.-Milwaukee. Dept. of Civil Engineering.
V. W. Bacon, R. T. Balmer, and R. G. Griskey.
Water and Sewage Works, Vol 124, No 9, p 121-124, September, 1977. 10 fig, 1 tab, 18 ref.

Descriptors: *Oxygenation, *Aeration, *Dissolved oxygen, *Oxygen requirements, *Gases, Air-water interfaces, Boundary processes, Equipment, Pilot plants, Energy, Mathematical models, Design criteria, *Waste water treatment.
Identifiers: Oxygen transfer, Fine bubble diffusers.

A 31,000-gal test facility in Glendale, Wisconsin, was used to evaluate the Air-Aqua fine bubble diffuser system manufactured by Hinde Engineering Company. Design data for the oxygenation tank, which contained seven lengths of Air-Aqua tubing and 11 samplers, are presented. Data were collected on dissolved oxygen saturation of the tank with coarse bubble diffusers and deoxygenation. An equation to represent mass transfer in a gas-liquid contacting process is presented. The overall oxygen mass transfer coefficient is related to the oxygen deficit, temperature, and depth. Data collected at the Glendale facility indicate that the overall oxygen mass transfer coefficient increases with decreasing depth at constant aeration rates and with increasing aeration at constant depth. The effects were attributed to increased aeration which resulted in greater mixing and gas throughput, and greater mixing at lower depths caused by a concentration gradient. A quotient for the amount of oxygen transferred to the test water at standard conditions is derived. The efficiency of the aeration system is calculated on the basis of the transfer coefficient and the amount of oxygen added to the system. Efficiencies at the test site ranged from 16.2% to 25%. Oxygen transfer efficiency is related to blower horsepower. The effects of depths, air flow rate, and aeration time on the oxygen deficit, oxygen transfer rate, and oxygenation efficiency are illustrated. Tests at the Glendale facility suggested that the Air Aqua system was competitive in terms of efficiency and oxygen transfer rates. (Schulz-FIRL)
W78-01468

CONVERSION OF SLUDGES INTO 'TOPSOILS' BY EARTHWORMS,
State Univ. of New York at Syracuse. Coll. of Environmental Science and Forestry.
For primary bibliographic entry see Field 5E.
W78-01469

SIGNIFICANCE OF DIURNAL VARIATIONS IN FECAL COLIFORM DIE-OFF RATES IN THE DESIGN OF OCEAN OUTFALLS,
Caldwell Connell Engineers, Melbourne (Australia).
For primary bibliographic entry see Field 5E.
W78-01471

CHLORINATED WASTEWATER OUTFIT IS PORTABLE.
For primary bibliographic entry see Field 5A.
W78-01473

OPTIMAL USE OF INSTRUMENTAL NEUTRON AND PHOTON ACTIVATION ANALYSES FOR MULTIELEMENT DETERMINATIONS IN SEWAGE SLUDGES,
Dalhousie Univ., Halifax (Nova Scotia). Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W78-01476

ANALYSIS FOR TOXIC SUBSTANCES PRESENT IN WASTE WATER FOR BIOLOGICAL PURIFICATION PURPOSES (PRUEFUNG VON ABWASSERINHALTSSTOFFEN AUF GIFTWIRKUNG FUER DIE BIOLOGISCHE KLAERSTUIE),
Eidgenoessische Materialpruefungs- und Versuchsanstalt, Sankt Gallen (Switzerland). Vorsteher der Abt. Chemie.
For primary bibliographic entry see Field 5A.
W78-01480

A SEMICONTINUOUS EXPERIMENTAL TECHNIQUE FOR THE STUDY OF THE INFLUENCE OF MIXING CONDITIONS ON THE HOMOGENEITY OF SEWAGE SLUDGE,
Companhia Estadual de Technologia de Sameamento Basico e de Defesa do Meio Ambiente, Sao Paulo (Brazil). Superintendencia de Pesquisa.
G. Taralli, M. D. Eduardo, E. D. Honorio, and M. B. Filgueira.
Biotechnology and Bioengineering, Vol. XIX, No. 7, p 1087-1090, July, 1977. 2 fig, 2 ref.

Descriptors: *Anaerobic digestion, *Mixing, *Sludge treatment, *Homogeneity, *Analytical techniques, Physical properties, Sampling, Digestion tanks, Sludge digestion, Equipment, Measurement, Equations, *Waste water treatment.
Identifiers: Sludge homogeneity, Anaerobic digester performance, Sludge mixing, Sao Paulo(Brazil).

A semicontinuous experimental technique for defining correlations between mixing and sludge homogeneity with anaerobic digestion is presented. Small volumes of sludge are periodically removed from the digester and the same volume of water is added. A series of equations relating the amount of sludge removed, the effective dilution, and the sludge concentration are presented. The system can be considered homogeneous if the final sludge concentration follows a prescribed function. Possible experimental errors are indicated when the volume of sludge periodically removed from the digester is large with respect to the total volume of sludge in the digester. However, the dilution factor and the time interval between sample removal must be sufficiently large for proper equilibration of the system. An example of the semicontinuous technique in an experiment with sewage sludge from a primary settling tank at the Pinheiros sewage treatment plant in Sao Paulo, Brazil, is presented. (Schulz-FIRL)
W78-01481

KINETICS AND STOICHIOMETRY OF COMPLETELY MIXED ACTIVATED SLUDGE,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Civil Engineering.
J. H. Sherrard.
Journal Water Pollution Control Federation, Vol. 49, No. 9, p 1968-1975, September, 1977. 6 fig, 1 tab, 24 ref.

Descriptors: *Kinetics, *Mathematical models, *Activated sludge, Equations, *Microbial degradation, Sludge digestion, Microorganisms, Biochemical oxygen demand, Nitrogen, Sewage treatment, Biological treatment, *Waste water treatment.
Identifiers: Activated sludge stoichiometry, Mean cell residence time, Materials balance, Waste water stoichiometry.

Microbiological principles, materials balance equations, and the stoichiometric composition of waste water are examined with respect to the completely mixed activated sludge process. Mathematical equations for microbial growth kinetics are derived. Mathematical relationships which describe bacterial growth and substrate utilization are developed from a series of materials balance equations. Parameters defined include: the yield coefficient, the mean cell residence time, the rate of substrate utilization per unit weight of microorganisms, and the food:microorganism ratio. An example problem is calculated according to the described relationships for industrial waste water with a flow rate of 1 mgd and a temperature of 20C which is treated in a completely mixed activated sludge process. Effluent waste concentration, treatment efficiency, aeration basin volatile suspended solids, waste sludge production, and the food:microorganism ratio are plotted against the mean cell residence time. (Schulz-FIRL)
W78-01482

FUNCTIONAL DESIGN OF ACTIVATED SLUDGE PROCESSES,
Oklahoma State Univ., Stillwater. Dept. of Bioenvironmental Engineering.
A. F. Gaudy, Jr., and D. F. Kincannon.
Water and Sewage Works, Vol. 124, No. 9, p 76-81, September, 1977. 4 fig, 2 tab, 9 ref.

Descriptors: *Activated sludge, *Mathematical models, *Aeration, *Design criteria, *Equations,

Microorganisms, Sludge treatment, Biochemical oxygen demand, *Waste water treatment.
Identifiers: Materials balance, Aeration tank volume.

Mathematical models for the functional design of activated sludge processes which include design equations based on simultaneous solution of mass balances and equations for direct solution of tank volume are examined. Equations for the mass rate of change in biomass concentration and the effluent substrate concentration are presented. The reaction tank volume is derived as a function of net specific growth rate. Expressions are presented for the recycle flow ratio and the biological solids concentration in the aeration tank. A materials balance for biological solids around the clarifier at steady state conditions is used to provide an expression for excess sludge production. The model is illustrated with a numerical example at the following design conditions: BOD of primary effluent (275 mg/liter), flow rate (10 mgd), required effluent BOD (30 mg/liter), and required suspended solids (30 mg/liter). Use of the model entails: collection of data to characterize the concentration of soluble substrate in the influent; characterization of biomass by determining the saturation constant, maximum specific growth rate, true sludge or cell yield, and the maintenance energy; the determination of the required net growth rate, the selection of recycle flow ratios to give the required concentration of soluble substrate in effluent; calculation of biological solids in the aeration tank; and determination of aeration tank volume, excess sludge production, and metabolic oxygen requirements. (Schulz-FIRL)
W78-01483

CHEMICAL WASTE WATER TREATMENT METHOD,
Carvalho (Rocky), Salem, OR. (Assignee).
P. J. Horvath.
United States Patent 4,049,545. Issued September 20, 1977. Official Gazette of the United States Patent Office, Vol. 962, No. 3, p 1235-1236, September, 1977. 1 fig.

Descriptors: *Suspended solids, *Chemical precipitation, *Patents, *Hydrogen ion concentration, *Separation techniques, Flocculation, Acids, Oxidation, Disinfection, Filtration, Municipal wastes, Industrial wastes, Organic wastes, *Waste water treatment.
Identifiers: Chemical waste water treatment.

A chemical method of treating waste water which has a pH below 9.0, contains nitrifying bacteria, and has in excess of 200 mg total solids per liter has been patented. The process is suggested for use with municipal, industrial, commercial, and agricultural waste waters which contain organic wastes. The pH of the waste water is first raised to 9-11 to kill any nitrifying bacteria. This is accomplished with the addition of an alkaline coagulant such as portland cement, lime, or sodium silicate. An acidifying agent such as copper sulfate, sulfuric acid, hydrochloric acid, aluminum salts, or ferric iron salts is then added to lower the pH by one unit and cause the precipitation of suspended solids. After the aggregated suspended solids are removed from the mixture, the pH is lowered again to 6-8.5 to further precipitate any suspended solids. Once these solids are removed, an oxidizing and disinfecting agent is added to render the remaining solids filterable. After the mixture is filtered, a second oxidizing and disinfecting agent is added to lower the BOD level to less than 20 mg/liter. (Schulz-FIRL)
W78-01484

WATER TREATMENT SYSTEM,
Environmental Filtration Products, Inc., Orlando, FL. (Assignee).
J. A. Borchardt.
United States Patent 4,051,032. Issued September 27, 1977. Official Gazette of the United States Patent Office, Vol. 962, No. 4, p 1723, September, 1977. 1 fig.

Descriptors: *Filters, *Patents, *Effluents, *Porous media, *Filtration, Particle size, Operation and maintenance, Equipment, Waste water treatment.

A patent has been issued for a waste water treatment system composed of a closed tank with an effluent inlet and outlet at opposite ends of the tank to provide a horizontal flow of waste water through the system. A number of septa are provided to divide the tank serially into subchambers along the effluent flow path. The septa are filled with a particulate media so that effluent first passes through a coarse particulate medium and then through a fine particulate medium. The coarse medium can be horizontally backwashed, and the chamber containing the fine medium can be expanded and vertically backwashed. (Schulz-FIRL)
W78-01485

ORGANIC WASTE TREATING AND CONVERSION SYSTEM,
G. H. Brimball.
United States Patent 4,050,907. Issued September 27, 1977. Official Gazette of the United States Patent Office, Vol. 962, No. 4, p 1686, September, 1977. 1 fig.

Descriptors: *Heat treatment, *Patents, *Organic wastes, *Fuels, *Equipment, Heat exchangers, Design data, Heating, Gases, *Waste water treatment.

A system for the treatment and conversion of organic wastes has been patented. The system includes a waste treatment tank equipped with a heating fluid conduit circuit. The portion of the heating conduit which passes through the waste treatment tank can be vibrated, and a pump is provided to circulate the fluid within the circuit. The fluid is heated by a furnace outside of the tank and supplemental heating in the external portion of the conduit circuit. Gas generated in the waste treatment tank is used for combustion in the furnace. The tank itself is a vertical well which has a depth substantially greater than its width. Radiation diffusers are located at the top of the well and means for the recovery of waste-generated gases are provided. (Schulz-FIRL)
W78-01486

TREATMENT OF SEWAGE,
BOC Ltd., London (England). (Assignee).
K. C. Smith, and M. E. Garrett.
United States Patent 4,039,437. Issued August 2, 1977. Official Gazette of the United States Patent Office, Vol. 961, No. 1, p 253, August, 1977.

Descriptors: *Sewerage, *Sewage treatment, *Biological treatment, *Packed beds, *Oxygenation, *Patents, Aerobic treatment, Aeration, Microorganisms, Sewers, Conveyance structures, Sewage bacteria, Design data, Biodegradation, Pipes, Microbial degradation, *Waste water treatment.

A sewage treatment process which reduces the biochemical oxygen demand of sewage while it is entrained in a sewer has been patented. Pressurized oxygenated gas is injected into the sewer to provide aerobic conditions suitable for the growth of microorganisms. A longitudinal biological contactor which is attached to the upper surface of the sewer pipe is designed to provide a suitable matrix for microorganism growth without obstructing sewage flow. The matrix, which contains a bed of solid material to increase surface area available for microorganism growth, extends longitudinally for a significant distance through the sewer but does not extend below the central axis. Sewage flows through the matrix via a series of longitudinal passages created by separated pieces of sheet material. (Schulz-FIRL)
W78-01487

SYSTEM FOR POLLUTION SUPPRESSION,
TII Corp., Lindenhurst, NY. (Assignee).
E. T. Armstrong.
United States Patent 4,045,347. Issued August 30, 1977. Official Gazette of the United States Patent Office, Vol. 961, No. 5, p 2227, August, 1977.

Descriptors: *Disinfection, *Effluents, Equipment, *Patents, *Water pollution control, Pipes, *Waste water treatment.

A disinfectant mixing system for use with influent in waste water treatment has been patented. The system uses a contact tank which includes: an influent inlet port which feeds a manifold; a pipe bundle with flat-plate orifice, high momentum exchange mixing members; and influent and effluent wells. A disinfecting fluid is injected into each pipe of the bundle at the point of highest momentum exchange. Effluent from the pipe bundle is delivered to a contact tank via a hyperbolic transformed diffuser. After the effluent is contacted with the disinfectant, it flows to an effluent trough. (Schulz-FIRL)
W78-01488

WASTE TREATMENT SYSTEM,
BDH, Inc., Rome, GA. (Assignee).
J. H. Bowen.
United States Patent 4,042,509. Issued August 16, 1977. Official Gazette of the United States Patent Office, Vol. 961, No. 3, p 1278-1279. August, 1977.

Descriptors: *Oxidation, *Ozone, *Disinfection, *Organic wastes, *Patents, Effluents, Filters, Equipment, Ultrasonics, *Waste water treatment.

A waste water treatment system which employs ozone for oxidation of effluent has been patented. The system includes: a conduit to supply effluent, a self-cleaning filter assembly to remove solids from the effluent, and an ozone and oxidation assembly for treating effluent. Filtered effluent which has been subjected to oxidation and ozonation passes through an ultrasonic sound-generating assembly to break down particles in the effluent. The effluent then passes through a casing in which ozone is generated with an electric arc. A germicidal chamber and a chlorinator are provided for disinfection of the effluent. (Schulz-FIRL)
W78-01489

SEWAGE SYSTEM,
W. Shenk.
United States Patent 4,049,013. Issued September 20, 1977. Official Gazette of the United States Patent Office, Vol. 962, No. 3, p 1063-1064, September, 1977. 1 fig.

Descriptors: *Sewerage, *Pumping plants, *Pumping, *Patents, *Equipment, Wells, Sewage treatment, Sewers, *Waste water treatment.

An improved design for a sewage pumping station has been patented. The station is circular and has a drywall which is surrounded by an annular series of wells. Sewage can be distributed sequentially among portions of the series of wells without the need for an additional power source. Sewage can also be delivered selectively to the pumping system in a predetermined sequence. (Schulz-FIRL)
W78-01490

METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO, DES PLAINES, O'HARE WATER RECLAMATION PLANT AND SOLIDS PIPELINE, VOLUME II. APPENDICES.
Environmental Protection Agency, Chicago, IL. Region V.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 497,

Price codes: A15 in paper copy, A01 in microfiche.
EPA Report, May 1975 339 p, 22 append.

Descriptors: *Sewerage, *Environmental effects, *Treatment facilities, *Construction, Combined sewers, Sewage treatment, Benefits, Waste water treatment, Tunnels, Hydrology, Sewers, Organoleptic properties, Tertiary treatment, Solid wastes.
Identifiers: Chicago(IL).

Appendices to the final environmental impact statement for the O'Hare Water Reclamation plant and a solids pipeline in Chicago, Illinois, are presented. Topics discussed in the 22 appendices include: O'Hare area flood control activities, MSDGC TARP Program, O'Hare service area determination, health questionnaire and responses, geology, regional water resources, water conservation and reuse measures, justification of ultimate size, health aspects, odor control, process alternatives, solids handling alternatives, design criteria, HUD guidelines, flow projections, additional site information, a density graph and matrix for the city of Des Plaines, an aerosol literature survey, water quality data, ten state standards, and EPA correspondence. (Schulz-FIRL)
W78-01509

THE ACTIVATED SLUDGE PROCESS, PART II--DYNAMIC BEHAVIOUR,
Cape Town Univ. (South Africa). Dept. of Water Resources and Public Health Engineering.
G. A. Ekama, and G. V. R. Marais.
Water S. A., Vol. 3, No. 1, p 17-50, January, 1977. 48 fig, 10 tab, 10 ref, 1 append.

Descriptors: *Activated sludge, *Nitrogen, *Chemical oxygen demand, *Mathematical models, *Nitrification, Kinetics, Nutrient removal, Computer models, Equations, Biodegradation, Oxygen requirements, Sludge treatment, *Waste water treatment.
Identifiers: Completely-mixed activated sludge process, Carbonaceous degradation.

A model to describe the behavior of the activated sludge process under dynamic conditions for both carbonaceous and nitrogen degradation is presented. Aspects of carbonaceous degradation include influent COD fractions, biodegradable COD removal, synthesis of cell mass, endogenous respiration, and carbonaceous oxygen demand. Various aspects of nitrogen removal are discussed, including influent TKN fractions, nitrogen requirements for sludge, and the storage of nitrogen. The mathematical model includes basic differential equations for sludge generation, COD utilization, and nitrification. Equations are presented for the general form of the mass balance equation, the biodegradable COD in the reactor liquid, unbiodegradable COD in the reactor, active mass concentration in the reactor, the stored COD (as VSS) accumulated in the sludge, inert material accumulating through endogenous residue, inert material accumulating from the influent, rate of change of total mass (MLVSS), slowly biodegradable TKN, unbiodegradable nitrogen, immediately available nitrogen, nitrates in the reactor liquid, and oxygen utilization. The predictive abilities of the mathematical model were tested against experimental data. Activated sludge process performance is evaluated with respect to sinusoidal and square-varying loading conditions. A design example is presented for a completely-mixed activated sludge plant with a flow of 10 M liters/day, sludge age of 20 days, peak COD mass flow of 1.8 times the average COD mass flow, and sinusoidal loading conditions. (Schulz-FIRL)
W78-01511

STUDY ON SLUDGE TREATMENT--2ND REPORT,
For primary bibliographic entry see Field 5E.
W78-01512

ASSESSMENT OF MATHEMATICAL MODELS FOR STORM AND COMBINED SEWER MANAGEMENT, APPENDIX F: SELECTED COMPUTER INPUT AND OUTPUT,
Battelle Pacific Northwest Labs., Richland, WA.
Water and Land Resource Dept.
For primary bibliographic entry see Field 5B.
W78-01514

SIMULATION OF NUTRIENT LOADINGS IN SURFACE RUNOFF WITH THE NPS MODEL,
Hydrocomp, Inc., Palo Alto, CA.
For primary bibliographic entry see Field 5B.
W78-01515

PERFORMANCE INVESTIGATION OF THE MANNING MODEL S-4000 PORTABLE WASTEWATER SAMPLER AND THE MODEL F-3000 DIPPER FLOWMETER,
Environmental Monitoring and Support Lab., Cincinnati, OH.
For primary bibliographic entry see Field 5A.
W78-01516

CHEMICAL/BIOLOGICAL IMPLICATIONS OF USING CHLORINE AND OZONE FOR DISINFECTION,
Minnesota Univ., Duluth. Dept. of Chemistry.
For primary bibliographic entry see Field 5C.
W78-01517

EFFECTS OF ADVANCED WASTE TREATMENT AND FLOW AUGMENTATION ON WATER QUALITY DURING LOW STREAM FLOWS,
Heidelberg Coll., Tiffin, OH. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W78-01522

NEW ASPECTS OF CLOSED PROCESSING CIRCUITS IN THE PAPER AND PAPERBOARD INDUSTRY,
Sulzer Bros. Ltd., Winterthur (Switzerland).
B. Morgeli.
Paper, Vol 187, No 2, p 65-68, January 24, 1977. 7 fig, 9 ref.

Descriptors: *Pulp and paper industry, *Water conservation, Water pollution control, Pollution abatement, Recycling, Waste water treatment, Wastes, Industrial wastes, Water pollution treatment, Water pollution sources, Filtration, Filters, Colloids, Fibers(Plant), Salinity, Steel, Corrosion.
Identifiers: *Closed systems, White water(Paper machines).

All of the waste water in paper and paperboard mills cannot be returned to the pulp furnish, because rapid separators are not able to remove all fibers, fillers, and additives. If white water is to be used for feeding foam nozzles, edge sprayers, or high-pressure spray pipes, an additional treatment operation is necessary. Strategies to offset the increases in salinity and biological activity which result in clogged nozzles and severe corrosion of steel are discussed. Tests at a Swiss paper mill suggest that volumetric filtration using granular media is a reliable treatment. Besides removing coarser solids, it also eliminates colloids at the same time. To prevent the formation of lumps in the filter medium by long fibers, a microstrainer is placed before the filtration unit. Sludge water from the filtration unit enters a cyclone where any residual granules are removed. (Swichtenberg-IPC)
W78-01565

MECHANICAL AND BIOLOGICAL TREATMENT OF WASTE WATER FROM AN INTEGRATED PAPER AND PULP INDUSTRY. PART I. BENCH SCALE STUDIES AND EVALUATION OF POTENTIALLY SUITABLE TREATMENT METHODS,
Ahlstrom (A.) Osakeyhtio, Varkaus (Findland). Paper and Pulp Div.
R. Panula, A.-M. Kuvaja, and P. Hynninen.
Paperi ja Puu, Vol 59, Special issue No 4a, p 185-186, 188-190, April, 1977. 3 fig, 7 tab.

Descriptors: *Pulp wastes, *Waste water treatment, Wastes, Industrial wastes, Water pollution treatment, Biological treatment, Water pollution sources, Foreign countries, Europe, Water purification, Aerated lagoons, Activated sludge, Biochemical oxygen demand, Nitrogen compounds, Phosphorus compounds, Temperature, Sludge, Dewatering, Sludge treatment, Pulp and paper industry, Effluents, Waste treatment.
Identifiers: Finland, Sulfite pulp mills, Newsprint mills, Chemimechanical pulp mills.

Typical pulp and paper mill effluents (from the sulfite pulp, chemimechanical pulp, and newsprint plants of Varkaus Forest Industry, subsidiary of A. Ahlstrom Oy., Finland) were treated by mechanical clarification, lagoon aeration, and activated sludge process. The aerated lagoon gave good BOD removal, even with low N addition and without P addition. A detention time of 5-6 days, temperature of 12-18C, plus N addition gave a BOD removal of 60-70%. Sludge from biological treatment was more difficult to dewater than sludge from primary clarification. (Brown-IPC)
W78-01566

INDUSTRIAL WASTE WATERS: NOVEL TREATMENT OF WASTE WATERS IN CORRUGATED BOARD PRODUCTION (FABRIKATIONS-ABWAESSER: NEUARTIGE AUFBEREITUNG DER ABWAESSER IN DER WELLPAPPEN-PRODUKTION).
Papier Kunststoff Verarbeiter, Vol 12, No 6, p 89-90, June, 1977. 1 tab.

Descriptors: *Waste water treatment, *Flotation, Wastes, Industrial wastes, Water pollution sources, Water pollution treatment, Lubricants, Adhesives, Waste treatment, Sludge, Effluents, Water purification, Pulp and paper industry.
Identifiers: *Paper converting industry, Corrugated board, Printing inks, Aluminum sulfate.

A new flotation type of effluent clarifier is described in which the total effluent of a corrugated-board plant containing printing ink, adhesive, and lubricating oil is run into a surge tank. Gelatinized clumps and board fragments are filtered off, and the liquid is pumped into a reaction chamber and treated with alum, alkali, and a flocculant. The flotation sludge is skimmed from the clarification chamber and stored in a dewatering chest, from which it may be removed once a week. (Ward-IPC)
W78-01568

CONTROL OF THE RIVER SLANA POLLUTION CAUSED BY THE GEMERSKA HORKA PULP MILL (MOZNOSTI OBMEDZENIA ZNECISTOVANIA RIEKY SLANEJ CELULOZKOU V GEMERSKEJ HORKE),
Celprojekt Ruzomberok (Czechoslovakia).
J. Marek.
Papir a celuloza, Vol 32, No 4, p 117-118, 123, April, 1977.

Descriptors: *Water pollution control, *Waste water treatment, *Pulp wastes, Wastes, Industrial wastes, Waste treatment, Foreign countries, Europe, Pulp and paper industry, Effluents, Biochemical oxygen demand, Fermentation, Bleaching wastes, Sludge, Water pollution treatment, Water pollution sources, Sulfite liquors.
Identifiers: Sulfite pulp mills, Czechoslovakia, Slana River(Czechoslovakia).

The Gemerska Horka pulp mill (Czechoslovakia) has a capacity of 33,000 tons/year of calcium

bisulfite pulp. The mill is located on the Slana River with a 355-day flow of 1.28 cu m/sec. With the exception of 3 spent liquor storage basins, the mill does not have any pollution control facilities. The Czechoslovakian law requires a reduction in 5-day BOD discharges from the current 3,711 to 123 tons/year. To accomplish this, the mill will install 3 brown stock washers allowing for 98% liquor recovery, an ethyl alcohol plant, and spent liquor evaporator. The liquor after fermentation will be evaporated to 55% and sold as cattle feed binder, and converted into other lignin-based products. Bleachery effluents are going to be used for transport of ash and still sludge in storage ponds. Because of long retention and some sorption, a 60% BOD reduction is expected. (Trubacek-IPC)
W78-01569

COLOR REMOVAL TESTED AT PRINCE ALBERT (PULP CO. LTD.).
Pulp and Paper Canada, Vol 78, No 5, p 83, May, 1977.

Descriptors: *Bleaching wastes, *Color, *Waste water treatment, Wastes, Industrial wastes, Water pollution treatment, Water pollution sources, Foreign countries, Canada, Pulp wastes, Pulp and paper industry, Effluents, Fly ash, Water pollution control.

A small pilot plant has been installed at Prince Albert Pulp Co. in Saskatoon, Saskatchewan (Canada), to test a method for removing color from the caustic effluent of the bleach plant. The effluent is treated with fly ash and acid (viz., an acid-containing effluent from the chlorination stage). The acid releases chemicals in the fly ash which react with the coloring material, causing it to settle. (Swichtenberg-IPC)
W78-01570

DISPOSAL OF PAPER PULP MILL SLUDGE,
Consolidated-Bathurst Ltd., Montreal (Quebec). (Assignee).
For primary bibliographic entry see Field 5E.
W78-01573

PURIFICATION OF EFFLUENTS BY RADIATION POLYMERIZATION (RADIATSIONNO-POLIMERIZATSIONNAYA OCHISTKA STOCHNYKH VOD),
G. K. Nikonorova, V. N. Shubin, S. A. Brusentseva, and P. I. Dolin.
Vodnye Resursy, No. 3, p 149-155, 1976. 7 fig, 5 ref.

Descriptors: *Pulp wastes, *Waste water treatment, *Radiation, Foreign countries, Wastes, Industrial wastes, Water pollution sources, Pulp and paper industry, Effluents, Hydrogen ion concentration, Water purification, Sulfite liquors, Phenols, Ureas, Color, Irradiation, Waste treatment, Water pollution treatment, Polymers.
Identifiers: Soviet Union(USSR), Black liquors, Spent sulfite liquors, Acrolein, Methyl methacrylate, Acrylonitrile.

Results are described of studies on radiation polymerization of industrial effluents, conducted at the Institute of Electrochemistry of the Soviet Academy of Sciences. Studied were the effects of the nature of the monomer added to the effluent, of the purification of effluents, such as black liquor, spent sulfite liquor, and solutions of phenol, urea, and colored substances. The process appears to be universal, i.e., capable of purifying effluents from a variety of pollutants, using a number of different monomers (acrolein, methyl methacrylate, and acrylonitrile). The yield of the process (amount of particles formed upon absorption of 100 electron volts of energy) is generally high and increases with monomer concentration and with decreasing irradiation rate. The degree of purification increases with decreasing pH of the effluent (from 10 to 4.5). The irradiation after-effect, observed at acidic pH, makes it possible to reduce the irradiation dose. A 75-90% purification was achieved with spent pulping liquors. (Stapinski-IPC)
W78-01574

PROSPECTS FOR THE USE OF WATER EXTRACTION WITH ORGANIC SOLVENTS FOR THE PURIFICATION OF INDUSTRIAL EFFLUENTS (PERSPEKTIVI ZASTOSUVANNYA PROTSESU EKSTRAKTSII ORGANICHNIMI ROZCHINNIKAMI DLYA OCHISHCHENNYA PROMISLOVIKH STOKIV),
T. V. Knyaz'kova, and L. A. Kul'skii.
Dopovidi Akademiia Nauk Ukrains'koi RSR, Seriya B, No 5, p 429-432, 1976. English summary.

Descriptors: *Separation techniques, *Pulp wastes, *Organic compounds, *Solvents, *Waste water treatment, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Water pollution sources, Aqueous solutions, Chlorides, Nitrates, Sulfates, Pulp and paper industry, Effluents, Temperature.
Identifiers: Black liquors, Viscose rayon, Diisopropylamine, Triethylamine, Diethylmethylamine.

An extraction process for water recovery from industrial effluents consists in selective separation of water from solution with organic solvents. When highly selective solvents are used, such as diisopropylamine, triethylamine (TEA), or mixtures of the latter with diethylmethylamine, the ionic impurities and a large part of molecularly dissolved compounds are concentrated in the raffinate, while pure water passes into the organic phase in the form of a complex with the extractant. This complex can be decomposed into water and the extractant by raising the temperature. Studies showed that TEA is a good selective solvent for solutions of chlorides, nitrates, and sulfates. TEA is even more selective for solutions of alkali, as alkaline media reduce the hydrolysis of the amine. Experimental data are presented showing the efficiency of extraction applied to mineral salt solutions, to alkaline effluent from the production of viscose rayon fibers, to black liquor, and to overall effluent from the Kherson pulp and paper mill. In all cases extraction was conducted under conditions of 90% water recovery. Organic compounds contained in effluents of the pulp and paper mill, especially black liquor, are separated to a large extent along with mineral component. (Stapinski-IPC)
W78-01578

PROCESS FOR PURIFICATION OF LIGNIN-CONTAINING WASTE WATERS (VERFAREN ZUR REINIGUNG VON LIGNINHALTIGEN ABWARSSERN),
L. Muller.
German Patent (Offenlegungsschrift) No 2,517,665. November 11, 1976. 10 p, 1 tab, 12 claims.

Descriptors: *Pulp wastes, *Waste water treatment, *Lignins, *Chemical precipitation, *Patents, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Water pollution sources, Calcium compounds, Sulfite liquors, Pulp and paper industry, Effluents, Water purification.
Identifiers: Calcium aluminate, Calcium aluminate-ferrite.

A process for purifying lignin-containing effluents (e.g., sulfite pulping effluents) is based on addition, to the effluents, of hydraulically setting calcium aluminate and/or calcium aluminate-ferrite and separation of the precipitated materials in known manner. (Speckhard-IPC)
W78-01579

PROCESS FOR OXIDATIVE TREATMENT OF SULFIDE-, SULFITE-, AND THIOSULFATE-CONTAINING WASTE WATERS (VERFAHREN ZUR OXYDATIVEN BEHANDLUNG SULFID-, SULFIT-, UND THIOSULFATHALTIGER ABWAESSER),
O. Horak, P. Wegner, R. Muders, P. Schultz, and R. Enders.
German Patent (Offenlegungsschrift) No. 2,534,892. February 17, 1977. 11 p, 1 fig, 9 claims.

Descriptors: *Pulp wastes, *Sulfur compounds, *Waste water treatment, *Patents, Wastes, Industrial wastes, Lignins, Waste treatment, Water pollution treatment, Oxidation, Water pollution sources, Pulp and paper industry, Effluents, Dyes, Oxygen, Hydrogen ion concentration, Temperature, Pressure, Sulfur, Sulfates, Sulfides.
Identifiers: Sulfites, Thiosulfates.

A process for oxidizing waste water containing sulfide, sulfate, and/or thiosulfate (e.g., waste water from paper or dye manufacture) involves first contacting the waste waters, in the case where they contain sulfide, with technically pure oxygen at pH greater than 7, temperatures of 20-200C, and pressures up to 20 bars until substantially all of the sulfide is converted to thiosulfate, and then reacting the waste waters with technically pure oxygen at pressures up to 20 bars, optionally in the presence of catalysts, to practically complete formation of sulfate (temperature, 20-200C; pH 0-5 or 0-8 in the case of waste waters containing only sulfite). In the case of waste waters originally containing sulfide and/or thiosulfate, sulfur is obtained in addition to the sulfate. (Speckhard-IPC)
W78-01580

PROCESS FOR PURIFYING TURBID WATER (VERFAHREN ZUR REINIGUNG VON TRUEBEM WASSER),
K. Saitoh, and N. Nishijima.
German Patent (Offenlegungsschrift) No. 2,623,748. December 9, 1976. 13 p, 8 claims.

Descriptors: *Patents, *Waste water treatment, *Pulp wastes, *Turbidity, Wastes, Industrial wastes, Waste treatment, Water pollution treatment, Water purification, Metals, Ions, Hydrogen ion concentration, Aeration, Pulp and paper industry, Effluents, Clays, Aeration.
Identifiers: Aluminum sulfate, Iron compounds, Iron sulfate, Aluminum chloride, Zinc chloride, Dimethylaminoethyl methacrylate, Polyacrylics(Acrylic polymers).

A process for purifying turbid water containing clay or other foreign materials (e.g., paper manufacturing or mining effluents) is characterized by addition of polyvalent metal ions and a poly(aminomethacrylate) and introduction of bubbles into the resulting suspension at a pH of about 6-10. The polyvalent metal ions can be added in the form of aluminum sulfate, ferric sulfate, aluminum chloride, and/or zinc chloride. The poly(aminomethacrylate) can be a polymer of dimethylaminoethyl methacrylate. (Speckhard-IPC)
W78-01581

CONTROL OF ENVIRONMENTAL POLLUTION BY PULP AND PAPER INDUSTRY. 1. WATER QUALITY PARAMETERS (SOBRE EL CONTROL DE LA CONTAMINACION AMBIENTAL POR VERTIDOS DE LAS INDUSTRIAS DE CELULOSA Y PAPEL. 1. PARAMETROS MAS EMPLEADOS DE CALIDAD DE LAS AGUAS),
Instituto Nacional de Investigaciones Agrarias, Madrid (Spain). Dept. de Celulosa e Industrias de Extraccion.
For primary bibliographic entry see Field 5G.
W78-01582

WATER CONSERVATION PROBLEMS IN NORTHERN ITALY,
Bologna Environmental Agency, (Italy).
R. Cenerini.
Journal Water Pollution Control Federation, Vol. 49, No. 10, p 2118-2128, October 1977. 8 fig, 1 tab, 8 ref.

Descriptors: *Water conservation, *Regional analysis, *Water resources, *Water pollution control, *Water supply, *Activated sludge, Waste water treatment, Planning, Capital costs, Operating costs, Farm wastes, Water reuse.
Identifiers: *Italy, Bologna(Italy).

In Italy, as in most industrialized countries, heavy urbanization and expansion of industry in addition to changing technological processes have had a strong negative impact on aquatic ecosystems in the past 30 years. This article dealt with the main characteristics of regional water supplies and the impact of pollution on water resources in the Emilia-Romagna region, which has a population of 3.9 million. Emphasis of water conservation has been demonstrated by public authorities and industries in new programs, which include a new municipal waste water treatment plant for the region's largest city, Bologna. Benefits of the new plant, its main features, and data on investment and operating costs were presented. (Visocky-ISWS)
W78-01630

QUALITY OF EFFLUENTS FROM MECHANICAL PULPING PROCESSES,
Pulp and Paper Research Inst., Point Claire (Quebec).
A. Wong.
Pulp and Paper Canada, Vol. 78, No. 6, p 103-107, June, 1977. 3 fig, 6 tab, 33 ref.

Descriptors: *Pulp wastes, Pulp and paper industry, *Biochemical oxygen demand, *Environmental effects, Toxicity, Suspended solids, Water reuse, Fibers(Plant), Waste water management(Applied), Filtration, Activated carbon, Biological treatment, Industrial wastes, Waste water treatment.
Identifiers: Thermomechanical pulping, Stone groundwood, Refiner groundwood, Sulfite pulping.

Thermomechanical pulping (TMP) has been considered as an alternative to stone grinding or refining processes for the production of paper pulp. Effluent characteristics are described for thermomechanical pulping and compared with those produced in conventional groundwood processes. TMP effluents are usually transferred to the mill whitewater system during the pulp screening and deckering operations. Secondary effluents from TMP include chip washing effluent, plug screw feeder effluent, and condensates from the primary refiner stage. Studies on potential BOD loadings from the TMP are reviewed and indicate that TMP may produce greater amounts of BOD/ton of pulp than conventional mechanical pulping. Studies on the toxicities of TMP effluents indicated that the general degree of toxicity would be similar to that of conventional groundwood effluents unless additives such as Na2S03 are incorporated into the TMP process. Suspended solids loadings for TMP effluents should be somewhat lower due to the absence of fines. Adverse effects of metal ions could be increased during extensive recycling of whitewater since the equilibrium levels of the ions would increase. Various aspects of TMP effluent management are discussed and illustrated with three hypothetical examples. Investigations into the treatment of mechanical pulping effluents are reviewed for chemical treatment, biological filtration, and activated carbon adsorption. (Schulz-FIRL)
W78-01659

PAPER AND ALLIED PRODUCT, (LITERATURE REVIEW),
National Council of the Paper Industry for Air and Stream Improvement Inc., New York.
C. W. Gove, and I. Gellman.
Journal Water Pollution Control Federation, Vol. 49, No. 6, p 1127-1152, June, 1977. 194 ref.

Descriptors: *Reviews, *Bibliographies, Environmental effects, *Recycling, *Toxicity, *Bioassay, *Pulp and paper industry, Pulp wastes, Effluents, Chemical wastes, Bleaching wastes, Water reuse, Coagulation, Clarification, Activated sludge, Biological treatment, Adsorption, Membrane processes, Oxidation, Sludge treatment, Sludge disposal, Pilot plants, Industrial wastes, *Waste water treatment.

Literature pertaining to the characteristics, treatment, and disposal of wastes resulting from the manufacture of paper and allied products is reviewed. Various aspects of national policies, economics, and effluent sources and treatment are discussed. Studies of the effects of pulp and paper mill effluent on receiving waters are discussed with respect to water quality, indicator organisms, biodegradability, analytical techniques, and biological studies. Various aspects of the effects of pulp and paper mill effluents on aquatic organisms are reviewed, including toxicity and bioassays, analytical techniques, fish toxicity studies, crustacean toxicity studies, and toxic effluent constituents. Effluent characteristics are discussed with respect to bleaching wastes, whitewaters, phenols, color and lignins, fiber, and various other waste water constituents. Topics discussed in relation to pulping liquor disposal and recovery include chemical recovery for sulfite liquors, the closed cycle bleached kraft mill, by-product processing, fermentation, and treatment processes. Various methods of physiocochemical treatment are reviewed, including waste water renovation, reuse, and solids recovery; chemical coagulation and clarification; color reduction; adsorption and membrane processes; oxidation; and sludge handling and disposal. Aspects of secondary treatment which are discussed include mill facilities, activated sludge, aerated stabilization, joint municipal-industrial treatment, and pilot plant and laboratory studies. (Schulz-FIRL)
W78-01660

SOME INITIAL AQUACULTURE EXPERIMENTS IN RECIRCULATING WATER SYSTEMS,
Bayerische Landesanstalt fuer Wasserforschung, Wielen (West Germany). Aussenstelle.
For primary bibliographic entry see Field 5G.
W78-01669

DISPOSAL OF LIQUID EFFLUENT FROM SEWAGE TREATMENT PLANTS,
Hanna Enterprises, Inc., Kailua, HI. (Assignee).
B. N. Hanna.
U.S. Patent No. 4,013,087, 8 p, 5 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 956, No 4, p 1223, March 22, 1977.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, *Water pollution treatment, Sewage effluents, Waste water disposal, Waste disposal wells.

One of the methods of disposing of the effluent of sewage treatment plants is to use sewage disposal wells. This method is applicable particularly in environments where the earth is porous and capable of carrying off large quantities of liquids. In recent years, this method of effluent disposal has been widely used in the State of Hawaii. In accordance with the invention a feed system is provided for these disposal wells comprising a first or normal input, where the effluent is injected into the well by simple gravity feed. A second input is also provided, which is a pressurized feed, adapted to force the effluent into the well when the normal gravity injection is inadequate. The inadequacy of normal gravity injection may result either from the treatment plant, or from a malfunctioning of the normal feed as may result from the presence of solids in the effluent. In addition, the invention provides for the pressurized reverse purging of the wells, when necessary, to remove accumulated solids that may be blocking or slowing the feed of effluent into the well and its dispersion into the surrounding earth. (Sinha-OEIS)
W78-01684

PROCESS FOR REDUCING BOD IN FOOD PROCESSING PLANT WASTES,
Nalco Chemical Co., Oak Brook, IL. (Assignee).
W. R. Davis.
U.S. Patent No. 4,013,555, 3 p, 8 ref; Official Gazette of the United States Patent Office, Vol 956, No 4, p 1379, March 22, 1977.

Descriptors: *Patents, *Waste water treatment, *Industrial wastes, *Biochemical oxygen demand, Water pollution treatment, Flocculation, Hydrogen ion concentration, Separation techniques, Food processing industry.

The invention provides a series of treating steps which not only removes existing suspended matter, but also removes large quantities of the dissolved BOD from food processing operations by converting the soluble proteinaceous material combined in these wastes into an insoluble form which is capable of being acted upon by conventional water-treating coagulating and flocculating agents. The process for reducing BOD in aqueous food processing plant wastes comprises the following series of sequential steps: adjusting the pH of the waste to 3 or less to form finely divided suspended particles; readjusting the pH of the waste with sodium aluminate to a value within the range of 6-7.5; flocculating the particles with an anionic acrylamide polymer; and then removing and collecting the flocculated particles from the food processing plant wastes. (Sinha-OEIS)
W78-01688

SYSTEM FOR PURIFYING LIQUIDS,
H. C. Rosenberg.
U.S. Patent No. 4,013,558, 9 p, 7 fig, 13 ref; Official Gazette of the United States Patent Office, Vol 956, No 4, p 1380, March 22, 1977.

Descriptors: *Patents, *Water treatment, *Water purification, *Water quality control, *Water pollution control, Waste water treatment, Industrial wastes, Microwaves, Radiation, Flow control, Flow rates, Separation techniques.

The treatment of liquids or semi-liquids such as water, wastewater, oils, foods, pharmaceuticals, and any other material with a liquid component which can be made to flow through a conduit, is accomplished by improved methods for handling the material during the treatment cycle; and controlling the flow improves the efficiency ratio of energy input versus level of treatment. The system includes a purifier which treates the material by exposing it to microwave radiation while maintaining the material in a complex flow pattern such that the radiated energy is caused to impinge on all of the material during the treatment. This is accomplished by a device designated, an Inspirator, which creates a rotational fluid flow during the exposure cycle. The level of treatment is constantly sensed and rate of flow increased or decreased accordingly to maintain prescribed treatment for the type of material under treatment. This invention also provides an improved separation method to capture the contaminents in an easily removable container. The device is particularly appropriate for transport since it is relatively small and light, can be used to process small amounts of liquids on an intermittent cycle; can be secured for long periods without effecting its processing capability; or can be used in a continuous round-the-clock mode. (Sinha-OEIS)
W78-01690

SEPARATORS,
For primary bibliographic entry see Field 5G.
W78-01692

REMOVING OF BARK FINES FROM AQUEOUS SUSPENSIONS,
Johns-Manville Corp., Denver, CO. (Assignee).
G. R. Bell, and R. S. Lamar.
U.S. Patent No 4,014,788, 4 p, 7 ref; Official Gazette of the United States Patent Office, Vol 956, NO 5, p 1795, March 29, 1977.

Descriptors: *Patents, *Waste water treatment, *Water pollution control, *Industrial wastes, *Wood wastes, Bark, Filtration, Separation techniques, Pulp and paper industry.
Identifiers: Talc.

In the manufacture of wood pulp for use in making paper and other wood fiber products, it is first necessary to remove the bark from the logs. While this can be done using a dry process, a wet process offers many advantages. However, one big disadvantage of the wet process has been the inability to economically remove the bark fines from the water used in the wet process. This invention provides an economical manner of solving this problem by using a rotary vacuum precoat filter equipped with a rotating knife to remove the bark fines from at least a portion of the recirculating water in a wet debarking process and to avoid long range problems with such a process by adding a small amount of finely divided talc to the bark fines suspension prior to filtration. Not only does the talc addition control the pitch and resin contained in the bark fines so that it is no longer sticky without apparent adverse effect on filtration rates, but the talc also appears to agglomerate the finest bark particles so that less cake penetration results. (Sinha-OEIS)
W78-01696

WASTEWATER TREATMENT,
Systems Engineering and Mfg., Corp., Stoughton, MA. (Assignee).
J. Shorr.
U.S. Patent No 4,014,787, 11 p, 1 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 956, No 5, p 1795, March 29, 1977.

Descriptors: *Patents, *Waste water treatment, *Water pollution control, *Industrial wastes, *Heavy metals, Bonding, Particle size, Filtration, Separation techniques, Water reuse.
Identifiers: Metal plating industry.

Small particle size material such as heavy metal ions and/or other contaminant materials are removed from wastewater by combining the small particle size materials with a combining agent to form a soluble and/or insoluble bound material having a particle size sufficiently large to permit filtration of the wastewater with removal of the bound materials. The wastewater is wastewater from a commercial metal finishing operation such as metal plating and the combining agent is a metal in its oxide and/or hydroxide form and preferably oxides or hydroxides of iron and/or aluminum. The filtering step is carried out through an untrafiltration anisotropic or skinned membrane which permits high filtering rates with small membrane area and relatively low pressure. The method can be carried out in a batch operation or in a continuous operation which continuously produces filtered usable water and permits drawing off of the concentrate resulting from the filtration to an area where it can be treated for discharge to the environment or permits recovery of the metal ions. (Sinha-OEIS)
W78-01698

SEPARATION OF LIQUID PHASES,
Union Carbide Corp., New York. (Assignee).
W. R. Marshall, R. A. Gregory, Jr., and R. H. Handwerk.
U.S. Patent No 4,014,789, 7 p, 7 fig, 1 tab, 8 ref; Official Gazette of the United States Patent Office, Vol 956, No 5, p 1795-1796, March 29, 1977.

Descriptors: *Patents, *Waste water treatment, *Industrial wastes, *Organic wastes, Polymers, Immiscibility, Viscosity, *Separation techniques.
Identifiers: Phase separation.

The invention relates to the separation of immiscible liquid phases. Such separations arises in the production of synthetic organic polymers. Undesirable ingredients are washed out with an appropriate solvent or water. In accordance with the process phase separation of relatively high and low viscosity immiscible liquids is effected by providing and maintaining, between inner means in relative rotational movement within an outer sleeve or housing means, at least one zone of increased pressure constriction and of decreased pressure constriction; feeding a multi-phase mixture of relatively high viscosity and relatively low viscosity liquids to the interior of the sleeve between the zones of increased and decreased pressure constriction; and withdrawing the high viscosity liquid and the low viscosity liquid from the vicinities of the zones of increased and decreased pressure constriction, respectively. (Sinha-OEIS)
W78-01699

5E. Ultimate Disposal Of Wastes

TIME SERIES ANALYSIS ON AMMONIA CONCENTRATION AND LOAD VALUES OF THE RIVER RHINE,
Nijmegen Univ. (Netherlands). Dept. of Analytical Chemistry.
For primary bibliographic entry see Field 5B.
W78-01219

CHARACTERISTICS OF THE RUN-OFF RATE OF POLLUTION LOAD IN AN UNSEWERAGED AREA,
Kansai Univ., Osaka (Japan). Dept. of Engineering.
For primary bibliographic entry see Field 5B.
W78-01222

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE DELAWARE COUNTY, OHIO BOARD OF COMMISSIONERS, OLENTANGY ENVIRONMENTAL CONTROL CENTER AND INTERCEPTOR SYSTEM.
Environmental Protection Agency, Chicago, IL.
For primary bibliographic entry see Field 5D.
W78-01230

SEWAGE SLUDGE,
A. Michaels.
Public Works, Vol. 108, No. 10, p 60, October, 1977.

Descriptors: *Incineration, *Sludge treatment, *Sludge disposal, *Heat treatment, *Dewatering, Equipment, Energy, Gases, Sewage treatment, Sewage disposal, Waste water treatment.
Identifiers: Multiple-hearth incinerators, Scrubbers, Scrubbing fluids.

A combination sewage treatment and disposal system has been produced by the J. L. Winther Company, Incorporated, of Orinda, California. In the system, waste heat generated during multiple-hearth incineration is used to dewater the sludge. A schematic flow diagram is presented for the Winther Incinerator-Sludge Disposal System. The system includes a primary combustion zone, primary scrubbing fluid in the form of sewage sludge, a secondary combustion zone, and secondary scrubbing fluid in the form of primary clarifier overflow. Space is provided above the secondary combustion zone for an optional waste heat boiler. Advantages of the system are the elimination of the need for sludge treatment operations or supernatant recycling, and the use of surplus steam for other phases of the sewage treatment process. (Schulz-FIRL)
W78-01236

A NEW METHOD OF DISPOSAL OF BY-PRODUCT ACID SLUDGE FROM A LUBE REFINING PLANT,
Hindustan Petroleum Corp. Ltd., Bombay (India).
A. K. Mukhopadhyay, and V. Y. Desai.
Chemical Age of India, Vol. 28, No. 3, p 215-217, March, 1977. 4 tab, 5 ref.

Descriptors: *Chemical wastes, *Acids, *Oil industry, *Asphalt, *Construction materials, Bituminous materials, Sulfur compounds, Industrial wastes, Sludge disposal, Ultimate disposal, Waste water treatment.
Identifiers: Acid sludge, Sulfuric acid.

Conventional disposal methods for acid sludges from petroleum refineries which reclaim crankcase lubricating oils include incineration, acid recovery, landfilling, and neutralization with spent lime or caustic. Experiments were conducted to examine the feasibility of incorporating acid sludge into other refinery products such as industrial roofing asphalt. Results of elemental analyses of the acid sludge used in the study and a comparison of acid sludge and industrial asphalt properties are presented. Several varieties and concentrations of industrial asphalt and acid sludge were blended, and the properties of these modified mixtures were compared to those of industrial asphalt. A mixture of 1% acid sludge and 99% asphalt produced the most acceptable asphalt. Experiments with acid sludge concentrations greater than 1% indicated that althouth rheological properties of the asphalt were not affected by the additional sludge, increased concentrations of sulfuric acid and water-soluble sulfonates in the asphalt might pose environmental hazards. (Schulz-FIRL)
W78-01242

TEXAS WATERWAY PROVES CLEANUP TIDE IS TURNING,
For primary bibliographic entry see Field 5G.
W78-01245

TREATING WINERY WASTE USING AEROBIC LAGOONS,
Smith (S.) and Son Pty. Ltd., Angaston (Australia).
For primary bibliographic entry see Field 5D.
W78-01256

ISRAELI COWS ENJOY DISTILLERY WASTE.
Water and Waste Treatment, Vol. 20, No. 3, p 23, March, 1977.

Descriptors: *Nutrient removal, Food processing industry, *Organic wastes, *Cattle, *Feeds, Farm management, Distillation, Alcohols, Industrial wastes, Food chains, Effluents, *Waste water disposal.
Identifiers: *Distillery waste, *Israel.

Waste water generated by alcohol distilleries is usually rich in organic matter and can place heavy burdens on municipal sewage systems and oxidation ponds. Distilleries in Assis, Israel, use sugar beet molasses, juice extracted from citrus peels, imported cane sugar molasses, and yeast in the production of alcohol. Organic solids, ranging from 3-4% during citrus peel production and 10% during molasses use, were investigated as a possible source of nutrients for cattle. Treatment to yield a dehydrated powder which could be used as a supplemental feed was considered uneconomical. In light of the success achieved with the use of whey from cheese production for watering cattle, a program was initiated by the Israeli Agricultural Research Administration to investigate the use of

distillery effluent for similar purposes. The effluent was readily accepted, with daily consumption ranging from 10 to 25 liters per head. Available nutrients in the effluent allowed a reduction of 25% in the solid rations allotted to each cow. Weight gains for cattle fed 3 kg of grain and 3 kg of fodder averaged about 1.035 grams per day. Examinations and laboratory tests revealed no adverse effects in distillery effluent-consuming cattle. (Schulz-FIRL)
W78-01258

WASTE CITRUS ACTIVATED SLUDGE AS A POULTRY FEED INGREDIENT,
R. H. Jones, J. T. White, and B. L. Damron.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-240 672, Price codes: A04 in paper copy, A01 in microfiche. Report EPA-660/2-75-001, February 1975. 64 p, 5 fig, 24 tab, 14 ref.

Descriptors: *Feed, Citrus fruits, Poultry, *Farm management, *Sludge disposal, Centrifugation, Productivity, Organic wastes, Recycling, Industrial wastes, *Waste water treatment, Sludge treatment, Separation techniques.
Identifiers: *Citrus wastes, *Poultry feeds.

The use of waste activated sludge from a system treating concentrated citrus processing waste free from sanitary waste as a chicken feed supplement was investigated in pilot-seale studies in Winter Garden, Florida. The program included testing of two types of centrifuges, a solid bowl basket type and a disc type, for sludge handling. In the study, gravity-thickened centrifuged sludge was further dewatered with rotary kiln drying and sand bed drying before addition to poultry feed. Sludge at concentrations of 2.5%, 5.9%, 10.0%, and 20.0% was added to poultry feed during two short-term chick trials, an 8-wk broiler study, and a 6-month feeding period with laying hens. The study concluded that 5-10% sludge could be included in the diet of starting broiler chicks without adverse effects. Diets for broilers which contained 5-10% sludge also produced the best results with no reduction in palatability. In an evaluation of eggs produced by hens fed a diet consisting of 20% sludge, yolk color was considerably darker than that of the control, but yolk and albumen flavor were not significantly affected. (Schulz-FIRL)
W78-01269

EXXON CORP. V. TRAIN (EPA DENIED AUTHORITY TO REGULATE SUBSURFACE DISPOSAL OF WASTES).
For primary bibliographic entry see Field 6E.
W78-01396

CENTRAL KITSAP COUNTY WASTEWATER FACILITIES, (FINAL ENVIRONMENTAL IMPACT STATEMENT).
For primary bibliographic entry see Field 5D.
W78-01407

ADVANCED TECHNIQUES FOR INCINERATION OF MUNICIPAL SOLID WASTES,
Environmental Protection Agency, Washington, DC. Office of Solid Waste Management Programs.
J. DeMarco.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 355, Price codes: A02 in paper copy, A01 in microfiche. Report EPA-SW-38d. of, 1972. 15 p, 3 fig.

Descriptors: *Incineration, *Oxidation, *Waste disposal, *Design data, *Operation and maintenance, Municipal wastes, Treatment facilities, Environmental effects, On-site data collections, Solid wastes.
Identifiers: *Solid waste incineration.

A three-phase pyrolysis project in New York State is described. Sponsored by Erie County (New York, Torrax Corporation, Carborundum Company, A. E. Anderson Construction Corporation, America Gas Association, and other state and federal agencies, the project was designed to demonstrate the use of a 75-tpd pyrolysis system to convert municipal waste into an inert residue. Major subsystem components were designed, installed, and operated as a part of the first phase. System testing and installation of the remaining equipment for exhaust control comprised the second phase. Economic and technical data will be gathered during 24-hr operation of the system during the third phase. Major subsystems in the system include a super blast heater, a gasifier, a secondary combustion chamber, a gas cooler, and an air pollution control device. (Schulz-FIRL)
W78-01410

SEWAGE WORKS FOR TEL AVIV.
For primary bibliographic entry see Field 5D.
W78-01432

ADVANCED WASTEWATER TREATMENT INCLUDES REVERSE OSMOSIS.
Public Works, Vol. 108, No. 9, p 166, September, 1977.

Descriptors: *Reverse osmosis, *Tertiary treatment, *Groundwater recharge, *Saline water intrusion, *Injection, Waste disposal wells, Water resources development, Return flow, Activated carbon, Filtration, Sewage treatment, *Waste water treatment.
Identifiers: Orange County(CA).

A water reclamation and groundwater injection project of the Orange County Water District in California is described. Water Factory 21, an advanced waste water treatment plant, provides injection water to prevent intrusion of sea water into the area's groundwater supply. The facility includes chemical clarification, ammonia stripping, recarbonation, multi-media filtration, carbon adsorption, chlorination, an01W78-01443
W78-01440

LAB TO TEST BULRUSHES AS FILTERS FOR SEWAGE.
Water and Wastes Engineering, Vol. 14, No. 9, p 16, September, 1977.

Descriptors: *Return flow, *Tertiary treatment, *Nitrogen, *Phosphorus, *Bulrushes, Aquatic plants, Marsh plants, Marsh management, Irrigation practices, Nutrient removal, Filtration, Absorption, Fertilizers, Waste water treatment.
Identifiers: Port Charlotte(FL).

Environmental Quality Laboratory, Inc., a subsidiary of General Development Corporation, is investigating the use of bulrushes to create a low-cost, natural means of tertiary sewage treatment. In experiments at Port Charlotte, Florida, 6 inche bulrush plants were planted in plastic-lined troughs which were filled with water to create a half-acre artificial marsh. A 12-month testing program is being used to evaluate phosphorus and nitrogen removal from primary and secondary treated effluents by bulrushes in the waste water flooded artificial marsh. Since advanced waste water treatment is required for the future, the marshland filtration system may provide tertiary treatment at lower construction and maintenance costs than conventional systems would. (Schulz-FIRL)
W78-01444

SEWAGE SLUDGE ANSWERS ARE STILL NEEDED.
For primary bibliographic entry see Field 5C.
W78-01449

PUTTING POWDERED CARBON IN WASTEWATER TREATMENT.
For primary bibliographic entry see Field 5D.
W78-01451

COMPOSTING INDUSTRIAL AND MUNICIPAL WASTES PAPER MILL AND CITY TREATMENT PLANT,
Montachusett Regional Planning Commission, Fitchburg, Ma. 208 Water Quality Planning Program.
D. R. Weir, Jr.
Compost Science, Vol. 18, No. 4, p 27, July-August, 1977. 1 tab, 1 ref.

Descriptors: *Sludge disposal, *Sludge treatment, *Fertilizers, *Incineration, *Costs, Energy, Pulp wastes, Municipal wastes, Treatment facilities, Landfills, Industrial wastes, Waste water treatment, Activated sludge, Activated carbon.
Identifiers: Fitchburg(MA), *Composting.

Environmental Research and Technology and the Montachusett Regional Planning Commission were called upon to develop a proposal for the production of compost from a combination of paper mill and municipal waste water treatment sludges. The project was initiated as an energy and cost conservation measure and for compliance with objectives set out in the 1972 amendments to the Federal Water Pollution Control Act. Existing advanced waste water treatment plants in Fitchburg, Massachusetts, included an activated carbon absorption plant for the paper industry and a two-stage activated sludge and chemical precipitation plant for municipal wastes. Analyses of the sludges indicated that except for high cadmium levels, the 3 ton/day of sludge produced by the activated sludge plant and the 10 ton/day produced by the activated carbon plant would be safe for use as a fertilizer and humus soil conditioner. Previous annual expenses for sludge disposal included $50,000 in fuel costs for incineration of the municipal sludge and $25,000 for landfilling of the paper mill sludge. The proposed composting operation is expected to cost $20,000/yr or about $20/ton with a land requirement of about 3 acres for the full-scale operation. The project is also expected to eliminate possible nonpoint water pollution from land filling and air pollution from incineration. (Schulz-FIRL)
W78-01456

COMPOST LATRINES IN TANZANIA: A PRELIMINARY REPORT,
Tanzania National Scientific Research Council, Dar es Salaam.
R. Gurak, W. Kilama, and U. Winblad.
Compost Science, Vol. 18, No. 4, p 20-23, July-August, 1977. 3 fig, 17 ref.

Descriptors: *Public health, *Domestic wastes, *Environmental sanitation, *Diseases, *Foreign countries, Cesspools, Sewage treatment, Sewage disposal, Waste water treatment.
Identifiers: *Compost latrines, *Tanzania.

Diseases and parasites with the disposal of human wastes in Tanzania include enteric fevers such a typhoid and paratyphoid, bacillary dysentery, poliomyelitis, cholera, intestinal parasites, hookworm, ascaris lumbricoides, intestinal schistosomiasis, urinary schistosomiasis, and amoebiasis. A program for research and development of latrines for villages and low-income residential areas was initiated in 1975 to outline performance criteria for domestic waste disposal systems, to examine shortcomings of existing waste disposal systems, and to evaluate and recommend various methods of domestic waste treatment. General performance criteria were based on ecological, health, nuisance, operational, and cost considerations. Categories of compost latrine systems which were examined include discontinuous, alternating, continuous, and compact with heating systems. Results of a pilot pro-

gram with the construction of latrines in three villages in eastern Tanzania and in one squatter area on the outskirts of Dar es Salaam are presented. Problems associated with use of the latrines were related to the addition of excess liquid to the essentially dry systems. (Schulz-FIRL)
W78-01457

WHY NOT INCINERATE YOUR SCREENINGS,
A. P. Aldridge, and D. C. Day.
Water Services, Vol 81, No 978, p 486-488, August, 1977. 1 tab.

Descriptors: *Incineration, *Screens, *Sewage treatment, *Heat treatment, *Dewatering, *Sludge disposal, Equipment, Automation, Municipal wastes, Waste water treatment.
Identifiers: Screenings incineration, Screenings disposal.

Screenings at a sewage treatment plant are normally pulverized to a pumpable size or removed completely by screens before sewage enters the main treatment system. Conventional methods of screenings disposal include on-site landfills, on-site sludge incineration, private hauling, local refuse dumping, and local refuse incineration. The use of specially designed, on-site sludge incinerators is suggested as the most cost-effective, least objectionable method of screenings disposal. The Nichols Screenings Incinerator has a positive raking system to insure constant agitation of the screenings and a specially designed combustion system. The Nichols incinerator operates autothermally if the screenings are previously dewatered to a water content of approximately 65%, with supplemental fuel required only for incinerator warm-up and periods of low dewatering performance. Automatic controls for start-up and operation regulate the incinerator with monitoring of the temperature and amount of excess air in the combustion chamber. The Nichols incinerator produces a sterile, low volume ash residue which can be collected for disposal at a local dump or discharged to the sewage works for removal with the primary sludge. (Schulz-FIRL)
W78-01459

WASTEWATER REUSE BY THE TRUCKLOAD.
For primary bibliographic entry see Field 5D.
W78-01467

CONVERSION OF SLUDGES INTO 'TOPSOILS' BY EARTHWORMS,
State Univ. of New York at Syracuse. Coll. of Environmental Science and Forestry.
M. J. Mitchell, R. M. Mulligan, R. Hartenstein, and E. F. Neuhauser.
Compost Science, Vol 18, No 4, p 28-32, July/August, 1977. 2 fig, 4 tab, 9 ref.

Descriptors: *Worms, *Sludge digestion, *Soil chemistry, *Humic acids, *Decomposing organic matter, Organic soils, Bioassay, Annelids, Topsoil, Fertilizers, Organic wastes, Sludge treatment, Waste water treatment.
Identifiers: Eisenia foetida, Lumbricus terrestris, Onondaga County(NY).

Laboratory studies were used to evaluate the potential role of two varieties of earthworms, the redworm Eisenia foetida and the nightcrawler Lumbricus terrestris, in the conversion of odorous, chemically unstable sludges into rich organic soils. Chemical characteristics of the anaerobically and aerobically digested secondary sludges used in the study are presented. The sludges, obtained from four waste water treatment plants in Onondaga County, New York, contained appreciably larger amounts of organic matter and nitrogenous compounds than those in mineral soils. The anaerobic sludges collected at the Metropolitan and Morgan Road plants were extremely toxic to the earthworms and sowbugs, and the Ley Creek anaerobic sludge was moderately toxic. Aerobic sludges were avidly consumed and did not cause earthworm mortality. The rate at which sludge passes through the gut of redworms was examined as a function of sludge type, moisture, and temperature. Data on the bioacceleration of sludge decomposition in earthworm and terrestrial isopod excreta are presented. Changes in humic acid content of sludges as a function of worm activity were examined. Studies on the rate of total combustion of organic matter in sludges indicated that the ash content of the Meadowbrook sludge increases from 2.15% to 3.52% over a 4-wk period in the presence of nightcrawlers and redworms at concentrations of 24.1 and 14.5 g worm/100 g sludge, respectively. (Schulz-FIRL)
W78-01469

ECONOMICS OF TRANSPORTING WASTEWATER SLUDGE,
Environmental Protection Agency, Denver, CO. Region VIII.
T. J. Hillmer Jr.
Public Works, Vol 108, No 9, p 110-111, September, 1977. 2 fig, 1 tab.

Descriptors: *Sludge disposal, *Fertilizers, *Costs, *Ultimate disposal, *Estimated costs, Transportation, Operation and maintenance, Sewage disposal, Waste water disposal, Waste water treatment.

Land application of treated domestic sludge as a means of soil conditioning and waste disposal has prefaced this article on the economics of transporting waste water. Costs incurred in sewage sludge utilization systems at 15 sites in various parts of the United States are discussed. Cost factors for separate sectors of the process were used to develop a 'model' community for use in estimating costs and determining economic feasibility of land application. The model community is based on a system that treats an average flow of 10 mgd and produces 800 tons/yr of stabilized sludge as dry solids. Annual costs for land application in such a system are estimated at $27,400 or $35/ton. The total annual operating cost is divided according to labor, fringe benefits, vehicle operation and maintenance, and miscellaneous expenses. The total annual cost of land disposal of sludge is also plotted against average daily raw waste water flow from a linear regression of data obtained during the survey. (Schulz-FIRL)
W78-01470

SIGNIFICANCE OF DIURNAL VARIATIONS IN FECAL COLIFORM DIE-OFF RATES IN THE DESIGN OF OCEAN OUTFALLS,
Caldwell Connell Engineers, Melbourne (Australia).
J. T. Bellair, G. A. Parr-Smith, and I. G. Wallis.
Journal Water Pollution Control Federation, Vol 49, No 9, p 2022-2030, September, 1977. 5 fig, 3 tab, 10 ref.

Descriptors: *Coliforms, *Sewage bacteria, *Outfalls, *Disinfection, *Solar radiation, Waste dilution, Design criteria, Waste disposal, Water pollution control, Microorganisms, Bacteria, Sea water, Analytical techniques, On-site data collections, Waste water treatment.

The rate of die-off of fecal coliform bacteria was investigated as part of the design study for three deepwater ocean outfalls near Sydney, Australia. Plastic bags at the water surface and clear glass bottles suspended at various depths were used to examine the effects of initial dilution, ambient water conditions, and light attenuation on die-off rates. T-90 values for both types of sample containers were similar during hours of darkness. Largest die-off rates during hours of greatest light intensity were attributed to the effects of solar radiation. T-90 values exhibited strong diurnal variations ranging from a maximum of 40 hrs during the night to a minimum of 1.9 hrs just before noon. A strong inverse relationship between T-90 values and depth was attributed to decreasing solar radiation with depth by light attenuation. The diurnal variation in T-90 values was also reflected in fecal coliform densities on beaches adjacent to ocean outfalls. Equations representing the resultant fecal coliform density in bathing waters, the initial dilution, a diffusion factor, and a die-off for ocean outfalls are discussed. The location of outfalls in areas of high turbulence to create high initial dilutions is suggested, since fecal coliform densities may not be sufficiently reduced by other factors during the night. (Schulz-FIRL)
W78-01471

ENERGY USES AND RECOVERY IN SLUDGE DISPOSAL, PART 3,
SRI International, Menlo Park, CA.
J. L. Jones, D. C. Bomberger, Jr., and F. M. Lewis.
Water and Sewage Works, Vol. 124, No. 9, p 106-108, September, 1977. 3 fig, 2 tab, 3 ref.

Descriptors: *Incineration, *Costs, *Energy, *Sludge disposal, *Air pollution, *Sludge treatment, Electric power costs, Cost comparisons, Municipal wastes, Waste water treatment.
Identifiers: Sludge disposal costs, Air pollution control costs.

Sludge disposal and treatment options, relative energy requirements, and process cost sensitivities to recovered energy value are discussed with regard to municipal waste water treatment. Land application costs are controlled by land costs, application rates, and the quantity of sludge produced. Sludge handling costs for incinerating a 40% solids cake produced by chemical conditioning and dewatering by filter press are compared to the total operating costs for 10-, 100- and 500-mdg plants. Specific components of the direct operating cost for sludge disposal are represented as a percentage of total plant operating cost, including electric power, fuel, chemicals, and hauling and disposal. The control of air pollution resulting from sludge incineration is discussed. Relative flue gas volumes are compared for multiple hearth and fluidized bed incinerators, and are used to calculate electric power requirements for scrubber operations on the basis of feed solids, excess air, sludge solids content, and exhaust gas temperature. (Schulz-FIRL)
W78-01510

STUDY ON SLUDGE TREATMENT--2ND REPORT,
H. Kawahara, M. Tsuchida, Y. Koido, I. Endo, and M. Sago.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-258 673-T, Price codes: A02 in paper copy, A01 in microfiche. 1973. 67 p, 17 fig, 9 tab, 3 ref. Technical Report EPA TR74-38D. (Translated from Japanese).

Descriptors: *Cements, *Concrete technology, *Construction materials, *Strength of materials, *Concrete additives, Sludge treatment, Sludge disposal, Organic matter, Drying, Mechanical properties, Strength, Organic matter, Heavy metals, Waste water treatment.
Identifiers: Sludge solidification, Sludge-cement composites.

An English translation of the Japanese Annual Report of the Tokyo Metropolitan Research Institute for Environmental Protection, March, 1973, is presented. A method of sludge treatment and disposal which involves combining sewage sludge with cement for solidification is described. Results of investigations on the relationship between sludge-cement strength and the amount of organic substances in the sludge are presented. Various proportions of digested sludge and Portland cement were mixed and then hardened in molds. Results indicated that the effects of the amount of

organic substances were much greater at low cement:sludge ratios. Relationships between composite strength, sludge organic content, composite water content, and cement:sludge ratio are illustrated. The leaching of heavy metals from solidified sludge composites was also examined. The studies indicated that heavy metals were leached and exuded from sludge ash and cement blocks which contained sludge ash, but were not appreciably leached or exuded from conventional sewage sludge or sewage sludge-containing blocks. This was attributed to the fact that sludge ash generally contains higher concentrations of heavy metals than other sludge types. The recommended quantity of cement to produce sludge solidification was 5-7.5 kg cement/kg dried sludge. (Schulz-FIRL)
W78-01512

APPLICATION OF SEWAGE SLUDGE TO CROPLAND: APPRAISAL OF POTENTIAL HAZARDS OF THE HEAVY METALS TO PLANTS AND ANIMALS.
Council for Agricultural Science and Technology, Ames, IA.
For primary bibliographic entry see Field 5C.
W78-01513

REMOTELY SENSED AND LABORATORY SPECTRAL SIGNATURES OF AN OCEAN-DUMPED ACID WASTE,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
For primary bibliographic entry see Field 5A.
W78-01545

WATER SUPPLY AND TREATMENT: STATE-OF-THE-ART.
Stanley Consultants, Inc., Muscatine, IA.
For primary bibliographic entry see Field 5F.
W78-01572

DISPOSAL OF PAPER PULP MILL SLUDGE,
Consolidated-Bathurst Ltd., Montreal (Quebec). (Assignee).
K. N. Goel, and O. J. Walker.
United States Patent No. 4,030,968. June 21, 1977. 8 p.

Descriptors: *Sludge disposal, *Pulp and paper industry, *Waste treatment, *Patents, Sludge treatment, Wastes, Industrial wastes, Sludge, Solid wastes, Recycling, Nutrients, Pulp waste.

A process for disposing of surplus sludge from a system which microbiologically purifies spent pulping liquor effluent comprises injecting the surplus sludge into the digestion step of the pulping process whereby the sludge is digested and a wood pulp is formed which retains a part of the digested sludge. A second part of the sludge is discharged as a vendable gas, and a third portion is recycled to serve as a nutrient for the microbiological purification of the spent pulping liquor. (Lynch-IPC)
W78-01573

QUANTITATIVE MAPPING OF SUSPENDED SOLIDS IN WASTEWATER SLUDGE PLUMES IN THE NEW YORK BIGHT APEX,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
For primary bibliographic entry see Field 5B.
W78-01627

SHORT-TERM WATER COLUMN PERTURBATIONS CAUSED BY WASTEWATER SLUDGE DUMPING IN THE NEW YORK BIGHT APEX,
State Univ. of New York at Stony Brook. Marine Sciences Research Center.
For primary bibliographic entry see Field 5B.
W78-01628

5F. Water Treatment and Quality Alteration

CATALYTIC PROCESS FOR OZONATION OF WATER CONTAINING ORGANIC CONTAMINANTS,
Environmental Research and Application, Inc., Briarcliff Manor, NY. (Assignee).
For primary bibliographic entry see Field 5D.
W78-01189

POLYMERS FOR USE IN WATER TREATMENT,
Betz Labs., Inc., Trevose, PA. (Assignee).
I. T. Godlewski, J. J. Schuck, and B. L. Libutti.
U.S. Patent No. 4,029,577, 8 p, 6 tab, 4 ref; Official Gazette of the United States Patent Office, Vol 959, No 2, p 751-752, June 14, 1977.

Descriptors: *Patents, *Water treatment, *Scaling, *Cooling water, Organic compounds, Corrosion, Polymers, Recirculated water, Industrial water, Chemical reactions.

The invention relates to processes for controlling the formation and deposition of scale and/or suspended solid matter which otherwise would occur in aqueous mediums containing scale imparting ions and dispersed particles. It relates to the control of the formation of, the reduction and/or the prevention of the deposition of calcium phosphate, magnesium silicate and/or iron oxide, clay and mixtures thereof in cooling water, scrubber and steam generating systems, evaporators, and economisers by the introduction of an effective amount of a water soluble polymer to the water. The polymer is composed primarily of moieties derived from acrylic acid or its water soluble salt and hydroxy lower alkyl acrylate moieties or its water soluble salt. The polymers effective for the purpose are those preferably having a mole ratio of from about 34:1 to about 1:4 of acrylic acid to hydroxylated lower alkyl acrylate moieties. The lower alkyl is an alkyl of from 2 to 6 carbon atoms. (Sinha-OEIS)
W78-01190

SYSTEM FOR SOFTENING WATER,
Goodyear Tire and Rubber Co., Akron, OH. (Assignee).
R. E. Shivers.
U.S. Patent No. 4,029,576, 5 p, 2 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 959, No 2, p 751, June 14, 1977.

Descriptors: *Patents, *Water softening, *Water treatment, *Water purification, *Hardness, Zeolites, Resins, Filtration, Coals, Calcium carbonate, Separation techniques.

The system reduces the hardness of raw water to a level where it is suitable for circulation to a boiler for converting steam for generating power. The system employs a sedimentation tank in which a mixture of raw water, lime and soda ash is heated to cause the precipitation of calcium carbonate from the water as sludge. A filter has a bed of coal for removing sludge which escapes with the water removed from the sedimentation tank. A softener with a resinous bed of sodium zeolite resin further reduces the hardness of the water to a desired or tolerable level. A special filter or trap between the coal filter and zeolite softener removes particles of coal carried along by the water as it flows through the coal filter, since the particles of coal eventually destroy the capacity and effectiveness of the zeolite softener. (Sinha-OEIS)
W78-01191

ELECTROSTATIC WATER TREATMENT SYSTEM,
Progressive Equipment Corp., Erie, PA. (Assignee).
D. C. Clark, and J. K. Barnard.
U.S. Patent No. 4,012,310, 4 p, 1 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 956, No 3, p 955, March 15, 1977.

Descriptors: *Patents, *Water treatment, *Water purification, *Electrodes, *Electrolysis, Electrochemistry, Equipment, Separation techniques.
Identifiers: *Electrostatics.

In an electrostatic water treatment system the high voltage d.c. supply for the charging electrode is alternately turned on and off at lower and upper voltage limits and is turned off whenever the current exceeds the desired value. The alternating voltage produced by the on-off operation of the high voltage supply is utilized to check the control circuit and provide an indication whenever the circuit is operating improperly. The electrode is at the center of an externally grounded shell. While the annular stream of water flows past the electrode, the positive charge on the electrode attracts free electrons from the water and minerals and causes electron collisions with mineral and biological material in the water. As a result, the mineral and biological material settle out and may be periodically flushed down a drain. (Sinha-OEIS)
W78-01202

PHOTO-INDUCED PURIFICATION OF WATER (1)- ULTRA-VIOLET ACCELERATION OF SEDIMENTATION OF METAL HYDROXIDE SUSPENSION IN WATER (HIKARI NI YORU MIZU NO JOKAHO (I)- HIKARI NIYORU GYOSHU CHINDEN NO SOKUSHIN),
Kyoto Univ. (Japan). Dept. of Hydrocarbon Chemistry.
For primary bibliographic entry see Field 5D.
W78-01253

THE RECLAMATION OF DRINKING WATER FROM SEWAGE,
Asian Inst. of Tech., Bangkok (Thailand).
For primary bibliographic entry see Field 5D.
W78-01406

EXPERIMENTAL STUDY OF SOME PROBLEMS OF THE BIOLOGICAL EFFECT OF WATER TREATED BY A CONSTANT MAGNETIC FIELD, (IN RUSSIAN),
Medical Academy, Varna (Bulgaria).
B. Stefanov, and S. Solakova.
Gig Sanit 8, p 70-72. 1975.

Descriptors: *Water treatment, *Magnetic studies, Biology, Rodents, Cholesterol, Ions, *Magnetic field, Potassium, Sodium.

The biological activity of H2O treated by a magnetic field with an induction of 0.1 tesla was more pronounced than that of H2O treated by a field of 0.6 tesla in albino rats. The animals that received H2O treated by a magnetic field for 45 days, there was a significant decrease of the absolute weight gain, content of total protein, Na+ and K+ content of blood serum and rectal temperature and a significant increase of the number of reticulocytes. A trend toward total blood cholesterol decrease was observed.--Copyright 1977 Biological Abstracts, Inc.
W78-01561

WATER SUPPLY AND TREATMENT: STATE-OF-THE-ART.
Stanley Consultants, Inc., Muscatine, IA.
Technical Association of the Pulp and Paper Industry (Atlanta, Georgia) Press Report TPR 68/3-77, 87 p. 1977. Fritchie, R. G. (Editor).

Descriptors: *Water treatment, *Water supply, *Publications, Filtration, Flotation, Water purification, Ion exchange, Cooling, Cooling water, Sludge treatment, Pumps, Solid wastes, Waste treatment.

This manual has been compiled from contributions of numerous scientists and engineers in chemical and consulting companies. It is organized into 9 chapters (the last 2 not yet completed) dealing with raw water treatment, microscreening, filtration, dissolved-air flotation systems, the function of clarification, ion-exchange, cooling systems and cooling water treatment, and (in preparation) pumping systems and alternatives for sludge handling. (Brown-IPC)
W78-01572

BACTERIAL RELATIONSHIPS IN STORM-WATERS,
Texas Univ. Health Science Center at Houston. School of Public Health.
For primary bibliographic entry see Field 5B.
W78-01640

SYSTEM FOR PURIFYING LIQUIDS,
For primary bibliographic entry see Field 5D.
W78-01690

5G. Water Quality Control

SYSTEM FOR SOFTENING WATER,
Goodyear Tire and Rubber Co., Akron, OH. (Assignee).
For primary bibliographic entry see Field 5F.
W78-01191

METHOD AND APPARATUS FOR PURIFYING WATER CONTAMINATED WITH ANODICALLY OXIDIZABLE ORGANIC MATTER,
Sachs-Systemtechnik G.m.b.H., Schweinfurt (West Germany).
For primary bibliographic entry see Field 5D.
W78-01195

COMPOSITION FOR SEPARATING HYDROCARBONS FROM WATER,
P. Preus.
U.S. Patent No. 4,011,175, 3 p, 8 ref; Official Gazette of the United States Patent Office, Vol 956, No 2, p 572, March 8, 1977.

Descriptors: *Patents, *Oil pollution, *Oil spills, *Water quality control, Absorption, Separation techniques, Cellulose, Perlite, Clays.
Identifiers: Hydrocarbons, Fibrous material.

Means are provided for controlling and eliminating hydrocarbons and other organic materials from water by selectively absorbing and stabilizing the material for subsequent mechanical separation. A loose fibrous material which is oleophilic, hydrophobic and floatable on water for selective absorption and stabilization of hydrocarbons in a hydrocarbon-water system is provided. It is of a particle size suitable for mechanical separation. A process is provided for producing such a material by compounding an expanded perlite with asphalt and a fibrous filler and comminuting the compound to provide a mass of an average particle size such that the mass can be filtered out of a liquid system by mechanical means pervious to flow of liquid through it. In a preferred embodiment a loose mass consists of expanded perlite, clays and a fibrous filler formed by demoisturizing an aqueous suspension of the compound. (Sinha - OEIS)
W78-01205

METHOD OF REMOVAL OF PETROLEUM PRODUCTS FROM SOLID OR LIQUID SURFACES,
Societe Chimique des Charbonnages, Paris (France). (Assignee).
C. Stein, and A. Marbach.
U.S. Patent No. 4,011,159, 3 p, 6 ref; Official Gazette of the United States Patent Office, Vol 956, No 2, p 567-568, March 8, 1977.

Descriptors: *Patents, *Oil pollution, *Oil spills, *Water quality control, Water pollution treatment, Organic compounds, Resins, Polymers, *Separation techniques.
Identifiers: Petroleum hydrocarbons.

A method of removal and recovery of hydrocarbons, especialy petroleum hydrocarbons such as crude petroleum or petroleum fractions from liquid or solid surfaces is described. The petroleum product is covered with a finely-divided solid polymer selected from the group consisting of poly(-bicyclo (2.2.1)heptene-2) and poly (methyl-5 bicyclo (2.2.1)heptene-2) mainly obtained by opening the cycle of bicyclo (2.2.1)heptene-2 and its methyl derivative. After the finely-divided polymer is applied to the petroleum a strong solid rubbery film results which can be removed by mechanical means. (Sinha-OEIS)
W78-01209

OIL-WATER SEPARATION PROCESS AND APPARATUS,
Liquid Processing Systems, Inc., San Leandro, CA. (Assignee).
D. G. Cook.
U.S. Patent No. 4,011,158, 12 p, 8 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 956, No 2, p 567, March 8, 1977.

Descriptors: *Patents, *Oil pollution, *Oily water, *Water quality control, *Water pollution treatment, *Separation techniques, Coalescence, Dispersion, Equipment.
Identifiers: Bilge water.

A system removes oil from an oil-water dispersion such as in bilge water to form an effluent of high purity. At lease one container for a coalescing medium (e.g., resin particles) is positioned in the interior of an upright reservoir wall and includes a liquid permeable lower wall in a frusto-conical shape in contact with water in the reservoir. The dispersion is directed through the coalescing medium where small oil droplets coalesce into larger ones which float to the surface of the aqueous reservoir to form a floating oil layer on the water. Purified water flows out from the lower portion of the reservoir in a radially outward direction. Prior to flow through the coalescing medium, the dispersion is optionally passed into a holding tank wherein material heavier than water is settled for periodic removal of heavy contaminants. Pitch accommodating means is provided to adapt the system to shipboard use. With a floating open bottomed reservoir wall and coalescing medium container, the system can be floated on a body of water with the purified water flowing out the bottom of the reservoir. (Sinha-OEIS)
W78-01210

WHITHER POLLUTION CONTROL,
W. F. Lester.
Journal of the Institute of Water Pollution Control, Vol. 76, No. 3, p 327-331, 1977. 1 fig, 2 tab, 3 ref.

Descriptors: *Water pollution control, *Legislation, *Water quality standards, *Effluents, River basin commissions, River regulation, Foreign countries, On-site data collections, Waste water disposal, Waste water treatment.
Identifiers: United Kingdom, Wales.

Various aspects of water pollution and water quality management in the United Kingdom are discussed. The organization of pollution control by the 10 regional water authorities in England and Wales is described. Standards imposed by the Control of Pollution Act of 1974, the main body of water pollution control legislation in England, are discussed. The Act grants new powers to the state f01W78-01221
W78-01220

WASTEWATER LOANS READIED BY EPA.
The American City and County, Vol. 92, No. 9, p 28, September, 1977.

Descriptors: *Financing, *Government finance, *Capital, *Loans, *Cost repayment, Interest, Credit, Economics, Waste water treatment.
Identifiers: Loan guarantees.

The U.S. Environmental Protection Agency's interim regulations on loan guarantees for waste water treatment works construction are discussed. The purpose of EPA loan guarantees is to provide a source of funding for municipalities that can not sell bonds or other maturities at reasonable rates on the open market. Financing can be used to cover all or part of a project. Applicants must prove that credit at reasonable rates from other sources was unavailable by furnishing the results of public bidding, certification from a municipal bond underwriter, certification from two or more local banks, and certification from the Farmers Home Administration. Proof of ability to repay the loan must also be furnished. The application fee is $1,000 or one-eight of 1% of the loan amount, whichever is greater but not to exceed $25,000. Repayment must be made within a period set by the EPA. (Schulz-FIRL)
W78-01223

POLLUTION CONTROL AND LEGISLATION IN THE FEDERAL REPUBLIC OF GERMANY,
H. E. Leroff.
Journal of the Institute of Water Pollution Control, Vol 76, No 3, p 271-276, 1977.

Descriptors: *Legislation, *Water pollution control, *Water quality standards, *Foreign countries, Sewage treatment, Taxes, Municipal wastes, Industrial wastes, Waste water treatment.
Identifiers: *Federal Republic of Germany.

Water pollution control problems in West Germany are compounded by the fact that pollution is imported by waterways that originate outside Germany's boundaries. International cooperation on water pollution control is enforced by the 1972 Treaties of Oslo and Paris, the European Water Resources Protection Commission, and the Rhine Protection Commission. The framework for water pollution control legislation in West Germany is the Water Resources Act of 1957 with its fourth amendment adopted in 1976. According to the 1957 Act, the creation of detailed regulations and the enforcement of water policy are left up to the individual states. Waste disposal is governed by the Federal Waste Disposal Law of 1972. The law's definition of waste excludes waste water discharged into the courses of waste water treatment plants, but sewage sludge treatment and disposal must conform to waste disposal regulations. Political interference and shortcomings of the legislation have allowed industries and municipalities to resist providing waste water treatment. A waste water taxation program is being considered under which the states will pay a waste water tax for discharging waste water into waterways, with the amount of tax depending on the contamination level of the waste water. Policies of the United Kingdom, the United States, and the German Federal Republic on uniform water quality standards are compared. (Schulz-FIRL)
W78-01224

POLLUTION CONTROL AND LEGISLATION--THE DUTCH APPROACH,
Public Health and Environmental Protection (Netherlands).
H. M. H. Scheltinga.
Journal of the Institute of Water Pollution Control, Vol 76, No 3, p 263-270, 1977. 1 fig, 2 ref, 2 append.

Descriptors: *Water pollution control, *Legislation, *Biological treatment, *Water quality standards, *Costs, Sewage treatment, Mu-

nicipal wastes, Industrial wastes, Foreign countries, Effluents, Waste water treatment.
Identifiers: Netherlands.

Various aspects of water pollution control and legislation in the Netherlands are discussed. The Pollution of Surface Waters Act of 1970 is the central core of water quality protection in the Netherlands. Based on the principle of decentralization, the Act delegates a portion of the responsibility for water quality management to provincial authorities. A 5-yr plan (1975-1979) was implemented to insure coordination and uniformity of practice with respect to planning, permits, and enforcement. General water standards and objectives are discussed. Discharge standards include required full biological sewage treatment for systems serving more than 500 people and 'best practicable technology' treatment for industries. Taxation for waste treatment is levied on a per capita basis for municipal wastes and in terms of COD and N loading for industrial wastes. Additional taxation for dischargers of heavy metals is being considered. The results obtained in water pollution control since 1970 are illustrated in a projection of 1960-1980 total pollution loading and biological treatment plant capacity in the Netherlands, with 60% of the total biodegradable organic pollution loading (municipal and industrial) slated for full biological treatment by 1980. (Schulz-FIRL)
W78-01225

EPA INDEXES SHOW SHRINKING COST HIKES.
Engineering News-Record, Vol 199, No 12, p 129, September, 1977. 3 tab.

Descriptors: *Costs, *Cost comparisons, *Construction costs, *Annual equivalent costs, *Cost trends, Municipal wastes, Sewers, Waste water treatment.
Identifiers: Cost indexes.

The U. S. Environmental Protection Agency's city indexes for waste water treatment costs are described. Cost indexes are presented for 25 cities in each of three categories based on hypothetical treatment facilities. The hypothetical facilities include a 5-mgd municipal waste water treatment plant, a 50-mgd municipal waste water treatment plant, and a complete urban sewer system. The cost index for the second quarter of 1977, based on the third quarter of 1973, and the percentage of change from the second quarter of 1976 are given for each of the cities. The cost index is also broken down according to percentages for labor, civil materials, other equipment, construction overhead, and buildings. Cost figures indicated that although sewage treatment costs rose from 0.7% to 8.3% above first quarter levels, the rise in construction costs was lower for the second quarter. Average cost increases from the first quarter to the second quarter were 1.9% for the 5-mgd plant, 2.0% for the 50-mgd plant, and 1.9% for the complete urban sewer system. (Schulz-FIRL)
W78-01226

PHYSICAL CHARACTERIZATION AND MICROBIOLOGICAL SETTLING-RATE MODIFICATION OF AQUEOUS SUSPENSIONS FROM HOT-WATER-PROCESS OIL-SANDS EXTRACTION,
Victoria Univ. (British Columbia). Dept. of Chemistry.
For primary bibliographic entry see Field 5D.
W78-01233

EFFECT OF CHEMICAL AGENTS ON SETTLING RATES OF SLUDGES FROM EFFLUENT OF HOT-WATER EXTRACTION OF ATHABASCA OIL SANDS,
Victoria Univ. (British Columbia). Dept. of Chemistry.
For primary bibliographic entry see Field 5D.
W78-01234

INCONSISTENT WASTE OILS EFFICIENTLY RECLAIMED WITH CENTRIFUGES.
Chemical Processing, Vol. 40, No. 4, p 64, April, 1977.

Descriptors: *Centrifugation, *Separation techniques, *Oily water, *Oil wastes, Equipment, Industrial wastes, *Waste water treatment.
Identifiers: Oil purifiers.

The Wallover Oil Company of Strongsville and East Liverpool, Ohio, uses four centrifuges to compound waste oil. The centrifuges, which are produced by the De Laval Separator Company in Poughkeepsie, New York, are used to remove water, dirt, pipe scale, metallic particles, and rust from oil-water emulsions. A 500-1300 gph self-cleaning oil purifier and two 5-15 gpm basket-type centrifuges are used at the Strongsville plant, and a 500-700 gph self-cleaning oil purifier is used at the East Liverpool facility. The basket-type unit is generally used to remove solid contaminants and waste oil is fed to the unit through a contoured feed pipe extending through the cover. Solids which are collected on the perforated basket wall by means of centrifugal force are pushed out by a plow. With the oil purifiers, feed passes from the top of a spinning bowl down through a central tubular shaft. Solids accumulate in a holding space at the bowl's periphery. The remaining liquid passes through a stack of perforated, conical discs with the heavier water-containing liquid travelling on the underside of the discs and the lighter oil-containing liquid moving on the upper surface of the discs. Purified oil is removed from the center of the bowl while accumulated impurities are discharged through holes in the bottom of the bowl. (Schulz-FIRL)
W78-01239

NEW WASTE-WATER-TREATMENT UNIT INSTALLED.
For primary bibliographic entry see Field 5D.
W78-01241

TEXAS WATERWAY PROVES CLEANUP TIDE IS TURNING,
W. Pryblek.
Chemical Engineering, Vol 84, No 17, p 98, 100, 102, August, 1977.

Descriptors: *Estuaries, *Water pollution control, *Industrial wastes, *Municipal wastes, *Texas, Oil wastes, Treatment facilities, Pollution abatement, Waste water treatment, Waste water disposal.
Identifiers: *Galveston Bay(Tex).

The success of water pollution abatement programs being conducted by chemical process industries which discharge into Galveston Bay in Texas is described. The site of a large number of petrochemical plants, Galvestin Bay also supports the area's shell-fishing industry and is used for recreational purposes. Low dissolved oxygen levels in the bay produced by high biochemical oxygen demand loading by the area's industries and municipalities led to massive fish kills in the upper part of Galveston Bay. High bacterial levels caused restrictions on shellfish harvesting. Water quality data for 1977 which illustrate the success of abatement programs by industry are presented by the Texas Water Quality Board. Results of an informal chemical engineering survey on the improvements in water quality are presented. Treatment systems are described for various industries on Galveston Bay, including Rohm and Haas Company, Shell Oil Company, Exxon Corporation, Diamond Shamrock Corporation, Southland Paper Mills, and Armco Steel Corporation. Regional waste water treatment facilities which are operated by the Gulf Coast Waste Disposal Authority to handle a number of companies' waste problems on a contract basis are described. A $550-million expansion program to provide adequate sewage treatment for the city of Houston is presented. (Schulz-FIRL)
W78-01245

CANADIAN STEEL MILL MEETS EFFLUENT GUIDELINES.
For primary bibliographic entry see Field 5D.
W78-01252

WASTE TREATMENT IN THE DANISH DAIRY INDUSTRY,
Statens Forsoegsmejeri, Hillerod (Denmark).
For primary bibliographic entry see Field 5D.
W78-01255

THE NET AMOUNT OF WATER REQUIRED FOR MINING OPERATIONS. (SCHULZ-FIRL)
e phosphatic clay slurries with 3-5% solids includes storage to settle out the clays to 12-15% solids and sprinkling of tailings sand over the settled clay to produce a thick sand-clay mixture. After the excess water is drained off, overburden is spread over the surface and appropriate vegetation is planted. The use of recycled water and the return of water to the aquifer via connector wells reduc
For primary bibliographic entry see Field 5D.
lones to produce a product which contains 70% sol

RECOVERY OF ORGANIC POLLUTANTS VIA SOLVENT EXTRACTION,
California Univ., Berkeley. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 5D.
W78-01263

UTILIZATION OF PULP AND PAPER INDUSTRY WASTES (UTILIZATSIYA OTKHODOV TSELLYULOZNO-BUMAZHNOGO PROIZVODSTVA),
Tsentralnyi Nauchno-Issledovatelskii Inst. Bumagi, Moscow USSR.
For primary bibliographic entry see Field 5D.
W78-01271

NEED TO CONTROL DISCHARGES FROM SEWERS CARRYING BOTH SEWAGE AND STORM RUNOFF (RPT. TO THE CONGRESS).
Comptroller General of the United States, Washington, D.C.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 294, Price codes: A04 in paper copy, A01 in microfiche. Technical Report B-166506, 1973. 54 p, 11 append.

Descriptors: *Combined sewers, *Water pollution control, Runoff, *Storm runoff, *Legislation, *Sewerage, Sewage treatment, Sewers, Water pollution sources, Waste water treatment.

A Congressional report by the Comptroller General of the United States is presented. Federal, state, and local efforts to abate and control discharges from combined sewers were examined. Possible adverse effects of combined sewer discharges are illustrated with five case histories. In general, federal and state efforts were considered inadequate in controlling pollution related to combined sewers. Legislative changes relating to combined sewers are presented. Federal construction programs and benefits available from phased construction of projects to control combined sewer discharges are described. Recommendations to the Environmental Protection Agency and comments by federal, state, and local governments are presented. (Schulz-FIRL)
W78-01281

REPORT ON EVALUATION OF WASTE SOURCES IN THE MEMPHIS, TENNESSEE AREA.
National Field Investigations Center-Denver, CO.
For primary bibliographic entry see Field 5B.
W78-01282

REPORT ON WATER QUALITY AND WASTE-SOURCE INVESTIGATIONS-MISSOURI RIVER AND PAPILLION CREEK, OMAHA, NEBRASKA.
National Field Investigations Center-Denver, CO.
For primary bibliographic entry see Field 5B.
W78-01283

WATER RESOURCE POLICY STUDY.
Water Resources Council, Washington, DC.
Federal Register, Vol. 42, No. 142, p. 37940-59, July 25, 1977.

Descriptors: Federal Water Pollution Control Act, *U.S. Water Resources Council, *Water quality, *Reservation Doctrine, *Water Resources Research Act, Construction, Coordination, Cost sharing, Research and development, Desalination, Environmental sanitation, Federal budget, Fertilizers, Industrial wastes, Municipal wastes, Municipal water, Sewage effluents, Sewage treatment, Waste treatment, Waste water treatment, Water conservation, Water pollution control, Water quality standards, Water reuse.
Identifiers: *Congressional hearings, *Federal Water Pollution Control Act Amendments of 1972, Environmental policy, Non-point sources(Pollution).

The Water Resources Council has published supplemental information on water quality, water resources research, and Federal reserved water rights. The water quality section discusses the approach taken to insure consideration of water quality in all planning, development, use, and management of water resources. It also contains an Environmental Protection Agency (EPA) statement concerning its experience with and proposals for implementation of the Federal Water Pollution Control Act of 1972. The EPA focus will be on controlling toxic pollutants and encouraging conservation, reuse and recycling of water and the elements currently being discharged in waste water. The strategy for meeting these objectives in both municipal and industrial areas are explained. The programs for control of non-point source pollution and regualtion of discharge of dredged and fill materials are also covered. The Water Resources Research section presents options for alleviating problems caused by fragmented research. The final section presents options for establishing procedures to quantify the amount of 'surplus' water subject to state appropriation under the Federal Reserved Water Rights doctrine in order to prevent using costly and time-consuming litigation to determine the respective rights of competing sovereigns under the doctrine. (Spector-Florida)
W78-01349

IS CONGRESS PROTECTING OUR WATER. THE CONTROVERSY OVER SECTION 404, FEDERAL WATER POLLUTION CONTROL AMENDMENTS OF 1972,
Environmental Protection Agency, Washington, DC. Office of General Counsel.
L. E. Caplin.
University of Miami Law Review, Vol 31, No 3, p. 445-95, Spring 1977.

Descriptors: *Navigable waters, *Permits, Federal Water Pollution Control Act, *Water pollution control, *Legislation, Pollutants, Rivers and Harbors Act, Aquatic habitats, Environmental effects, Water quality control, Regulation, Federal government, Jurisdiction, Water pollution sources, Water pollution effects, Discharge(Water), Dredging, Wetlands, High water mark, Protection.
Identifiers: *Federal Water Pollution Control Act Amendments of 1972, *National Environmental Policy Act, Fill permits, Non-point sources(Pollution), Private interest groups, Navigability, Navigability tests, National Pollution Discharge Elimination System.

In 1976 both Houses of Congress passed amendments to the Federal Water Pollution Control Act but they were unable to write a compromise amendment. The author discusses the environmental and political factors which led to the deadlock, presents the merits of the various proposals, and suggests a course of action for Congress to follow in its re-evaluation of the proposed amendments. The amendments deal with Section 404 of the Act which establishes a permit system for controlling discharge of dredged or fill material into navigable waters. The author feels the Baker-Randolph bill is the most environmentally responsible proposal. This bill recognized the need for broad jurisdiction, provides authority for delegation by the Environmental Protection Agency to the states of all waters lying within their respective jurisdictions, grants a limited exemption from permit requirements of various widespread buut relatively harmless activities, and provides for the general permitting of minor activities. However, the author suggests that the only changes needed are a clarification of what is a discharge of dredged or fill material, a provision for general permits of monor discharges, and a provision that certain discharges be authorized by regulation. (Hammersley-Florida)
W78-01350

PROCEEDINGS OF THE FIRST FEDERAL CONFERENCE ON THE GREAT LAKES, HELD AT ANN ARBOR, MICHIGAN, DECEMBER 13-15, 1972.
National Environmental Research Center, Grosse Ile, MI. Grosse Ile Lab.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-255 138, Price codes: A15 in paper copy, A01 in microfiche. 1972. 342 p.

Descriptors: *Great Lake region, *Administrative agencies, *Federal government, *International commissions, *International Joint Commission, Commercial fishing, Environment, Fisheries, Hydrology, Lampreys, Mapping, Mineral industry, Recreation, Satellites(Artificial), Sport fishing, St. Lawrence Seaway, Surveying instrument, Surveys, Transportation, Water pollution, Water levels, Waves(Water), Weather forecasting, Conferences.
Identifiers: *Administrative regulations, International agreements.

The Environmental Protection Agency hosted a conference of federal program managers to review the relevant research programs and plans for Great Lakes activities. The conference was concerned with the exposition and discussion of federal programs in marine science and engineering affecting the Great Lakes with the goal of coordinating federal activities in the Great Lakes region. Five discussion groups were established covering the areas of non-living resources and water supply; power and energy; living resources; navigation and transportation; and recreational needs. Each group developed a set of objectives and made recommendations based on these objectives. The conclusions of the conference were: (1) information exchange and program coordination between agencies is needed; (2) the conference satisfied the information exchange need; (3) a common understanding of the specific programs of each agency was developed; (4) informal coordination already exists but should be increased; (5) the conference should be expanded to include university, state and Canadian efforts on the Great Lakes. The committee reports and the papers presented by the fifteen federal agencies involved are included in the conference proceedings. (Capehart-Florida)
W78-01351

SPILL CLEANUP--WHAT ARE THE CAPABILITIES.
Journal Water Pollution Control Federation, Vol 49, No 5, p. 733-36, May 1977.

Descriptors: *Oil spills, Disasters, *Water pollution control, *Regulation, Water pollution, Water pollution sources, Coast Guard Regulations, Toxicity, Accidents, Abatement, Administrative agencies, Industries, Technology, Oceans, Water law, Oil industry, Solubility, Legal aspects, Environmental effects, Biology, Environmental engineering.
Identifiers: *Oil spill cleanup, *Water Pollution Control Act Amendments of 1972, *Hazardous substances(Pollution), Liability, Marine environment, Oil Pollution Act, Private interest groups, Supertankers.

Recent spills of oil and hazardous materials have prompted the enactment of oil spill legislation in the United States and other countries. Research and enforcement in the area of hazardous materials spills has been hampered because the regulations and list of substances have not yet been developed by the Environmental Protection Agency. However, under the Federal Water Pollution Control Act Amendments of 1972, the National Oil and Hazardous Substances Pollution Contingency Plan has been developed. The Environmental Protection Agency and the Coast Guard are responsible for the plan's implementation. The expertise in the plan comes from the Coast Guard's National Strike Force made up of three specially trained 18-man teams available on short notice 24 hours daily. The industrial sector has contributed to spill control by forming cooperatives or groups of companies in a particular geographical region to pool their resources for purchasing spill control equipment. The private sector has also become involved through the development of a number of companies specializing in spill clean-up. However, organizational weaknesses in the national plan and technological problems with high-sea spill containment require that on-going analysis of these systems continue. (Hammersley-Florida)
W78-01353

SECTION 404: A CONTROVERSIAL PROGRAM THAT GREW LIKE TOPSY,
P. S. Ward.
Journal Water Pollution Control Federation, Vol 49, No 5, p. 730-33, May 1977.

Descriptors: *Wetlands, *Jurisdiction, *Dredging, Federal Water Pollution Control Act, *Navigable waters, Water pollution, Landfills, Legislation, Federal government, Environmental effects, Water law, Legal aspects, Environmental engineering, Water policy, Planning, Judicial decisions, Bodies of water, Water, Permits.
Identifiers: *Federal Water Pollution Control Act Amendments of 1972, Navigability.

Section 404, governing federal regulation of dredge and fill activities, came from a House and Senate conference on PL 92-500 in 1972. The conference resolved that the regulatory system would be administered by the Corps of Engineers with the guidelines drawn up in conjunction with the Environmental Protection Agency (Agency (EPA). In addition, the EPA administrator was given veto power over the Corp's approval of any particular disposal site. In 1974, the Corps proposed to limit its authority under Section 404 by narrowly construing the term 'navigable waters'. However, in a suit brought against the Corps, a federal court upheld the broad definition in the original law. This decision, turned Section 404 into an effective vehicle for national wetlands protection. In 1975, the Corps and the EPA developed Section 404 regulations to be implemented in three phases over a 2-year period. Although implementation of these proposals met with opposition from both Congress and the Administration, the new Administration supports the broad scope of Section 404. Currently two questions remain essential to Section 404's future: (1) whether national wetlands protection is necessary; and (2) if so, whether Section 404 is the proper vehicle to provide it. (Hammersley-Florida)
W78-01354

COASTAL RESOURCE USE - DECISIONS ON PUGET SOUND,
Washington Univ., Seattle. Sea Grant Program.
For primary bibliographic entry see Field 6G.
W78-01355

BUREAU OF OUTDOOR RECREATION LOOKS AT WATER QUALITY,
Bureau of Outdoor Recreation, Washington, DC. Office of Communications.
G. M. Kyle.
Parks and Recreation, Vol. 12, No. 2, p. 19a-21a, February 1977.

Descriptors: *Waste water treatment, *Recreation facilities, *Land use, *Parks, Planning, Legislation, Water quality, Streams, Waste treatment, Sewage treatment, Cities, Water law, Sewage, Water tanks, Water pollution, Water pollution control, Swimming, Fishing, Landscaping, Multiple purpose.
Identifiers: *Environmental policy, *Bureau of Outdoor Recreation, *Federal Water Pollution Control Act Amendments of 1972.

The Water Pollution Control Act Amendments of 1972 have produced positive side-effects beyond the imagination of the creators of the water control program. One of the most pronounced impacts of the massive waste treatment program has been on public recreation, especially in urban areas. The author has summarized some of the ways in which the Bureau of Outdoor Recreation (BOR) and other organizations can work together to help realize the recreation potential under specified sections of the Water Pollution Control Act. The various sections are reviewed in the context of cooperation and participation of park and recreation professionals throughout the United States. BOR, working under the 1972 act, is seen as providing technical assistance in: (1) identifying recreational and pollution control needs; (2) securing finances; and (3) setting up pollution control projects which double as recreation facilities. Current examples of this coalition of pollution control and recreation include: (1) irrigation of landscape with waste water spray; (2) utilization of covers of water tanks and sewage treatment facilities as tennis courts and play spaces; and, (3) the restoration of public shorelines as safe swimming and fishing areas. (McPherson-Florida)
W78-01356

GABLE WATERS, ADJACENT WETLANDS AND COASTAL WETLANDS. IT PASSED IN THE HOUSE, BUT THE SENATE'S RESPONSE WAS A PROPOSAL RETAINING BROAD JURISDICTION, BUT SPLITTING THE PROGRAM BETWEEN THE CORPS AND THE ENVIRONMENTAL PROTECTION AGENCY. THE 95TH CONGRESS PLANS TO UNDERTAKE A FULL SCALE REVIEW OF THE WATER POLLUTION CONTROL ACT. (MAASS-FLORIDA)
sport interstate or foreign commerce. Supporters of the amendment argue that it merely restores the historic definition of navigable waters, while those opposing it contend it drastically reduces the most effective defense against destruction of irreplaceable wetlands. The Wright amendment, which modified the Breaux amendment, restricts the Corps' authority to issue permits only to commercially na
For primary bibliographic entry see Field 6E.
luded the Breaux amendment which strictly limite

PRIVATE COMPENSATION FOR OIL POLLUTION: FLORIDA'S PRACTICAL SOLUTION,
For primary bibliographic entry see Field 6E.
W78-01358

EUTROPHICATION: A THREAT TO NEW HAMPSHIRE'S LAKES AND PONDS - WHAT LEGAL TOOLS ARE AVAILABLE FOR PROTECTION,
Southern Rockingham Regional Planning District Commission, Salem, NH.
R. D. Sokolove.
New Hampshire Bar Journal, Vol. 18, No. 1, p. 23-46, September 1976.

Descriptors: *Eutrophication, *New Hampshire, *Lakes, *Zoning, *Land use, Environmental control, Environmental effects, Local governments, State governments, Legal aspects, Aging(Biological), Lake stages, Population, Water quality, Social aspects, Legislation, Water law, Land classification, Non-structural alternatives, Economic impact, Regional economics, Social impact.

Natural eutropincation changes a lake into a forest over a period of thousands of years. Cultural eutropincation is an accelerated version of the natural process caused by man's polluting tendencies. New Hampshire's lakes are becoming victims of the second type of eutropication. Four legal tools are available to meet this problem. Initially, local governments may promulgate land use regulations based upon a statutory enabling act to pass ordinances for the health, welfare and public safety of the community. Secondly, local planning boards may adopt regulations governing the subdivision of land so as to lessen any danger occasioned by an insufficient water supply. The power of local planning boards may possibly extend to a blanket moratorium over all future construction. Although zoning is another possible control mechanism, several nonconforming uses within the zoned area often defeat the hoped-for effect. A possible solution to this problem is the doctrine of amortization by which a nonconforming use is terminated after the owner is given time to recoup his investment and acquire money for relocation. A final alternative presented is a model statute aimed specifically at lake protection. (Moorhouse-Florida)
W78-01359

SPILL PREVENTION AND CONTROL: A SPECIAL REPORT,
Goodyear Tire and Rubber Co., Akron, OH. Chemigum Plant.
W. H. Weiss.
Pollution Engineering, Vol 8, No 11, p 22-29, November, 1976.

Descriptors: *Oil spills, *Control systems, Equipment, *Water pollution control, *Planning, Design standards, Safety factors, Monitoring, Oil pollution, Oily water, Fuels, Oil industry, Design, Reliability, Design criteria, Drains, Automatic control, Regulation, Protection, Personnel, Training, Inspection.
Identifiers: *Administrative regulations, Oil spill cleanup, Oil spill prevention, Federal Water Pollution Control Act Amendments of 1972, Spill Prevention Control and Countermeasure plans.

Spill prevention regulations, formulated pursuant to the Federal Water Pollution Control Act of 1972, require any facility that stores more than 1320 gallons of 'oil type' material to maintain a Spill Prevention Control and Countermeasure (SPCC) plan. This plan is to be made available to the Environmental Protection Agency and the Coast Guard for review and implementation in case of a spill. The SPCC plan should attempt to predict where a spill might occur and explain what equipment is available and what will be done to prevent the spill from reaching navigable waters. This article recommends methods and procedures that should increase the efficiency of containment once a spill has occurred. The recommendations include suggestions concerning plant design, monitors and controls, and equipment to limit the effected area of a spill. The author believes that proper training of personnel is extremely important. A general procedure to be followed in case of a spill is outlined. The author concludes that the most efficient way to prevent and control spills is to create a plan of action tailored to each specific plant's operation and personnel. A spill prevention plan checklist is included. (Curran-Florida)
W78-01361

CLEAN WATER (REPORT TO CONGRESS, 1974).
Environmental Protection Agency, Washington, DC.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-254 622, Price codes: A05 in paper copy, A01 in microfiche. June, 1974, 61 p, 5 tab.

Descriptors: *Water pollution sources, Federal Water Pollution Control Act, *Water pollution control, *Water quality control, *Water pollution effects, Effluents, Water quality standards, Legislation, Federal government, Administrative agencies, Water pollution treatment, Industrial wastes, Industrial water, Industrial plants, Law enforcement, Municipal wastes, Municipal water, Sewage, Waste water treatment, Chemicals, Agriculture, Waste disposal, Dredging.
Identifiers: *Federal Water Pollution Control Act Amendments of 1972, *Environmental Protection Agency, *National Pollution Discharge Elimination System, Administrative regulations, Effluent limitations, Effluent guidelines, Non-point sources(Pollution).

The Environmental Protection Agency (EPA), pursuant to Section 516(a) of the Federal Water Pollution Control Act, has submitted its annual report for 1973. During the year, the EPA awarded approximately $3 billion in municipal construction grants. Under the National Pollution Discharge Elimination System 2,037 municipal and industrial permits were issued and 6,266 draft permits were forwarded to states for approval. Of the 531 enforcement actions initiated, most were concerned with oil and hazardous substances liability. 71% of the municipal waste treatment works surveyed showed operational, mechanical or manpower deficiencies. Of 3,155 waterway segments classified, 1,546 should meet water quality standards under existing programs, while 1,609 will require more stringent controls. Waterways containing high degrees of nitrogen and phosphorous are of the poorest quality. The EPA also published reports identifying methods, processes and procedures to control non-point source pollution for various agricultural and industrial activities. Effluent limitation guidelines were established for 23 industrial categories. Nine toxic pollutants were identified and standards proposed to prohibit their discharge. (Moorhouse-Florida)
W78-01363

CLEAN WATER, REPORT TO CONGRESS-1974.
Environmental Protection Agency, Washington, DC.
EPA Report to Congress, June 1974. 88 pp, 19 photos, 24 tab, 5 append.

Descriptors: *Water quality control, *Regulation, *Grants, *Research and development, Administrative agencies, Federal jurisdiction, State jurisdiction, Pollution abatement, Waste water treatment, Water quality standards, Federal Water Pollution Control Act, Water pollution treatment, Effluents, Legal aspects, Sewage treatment, Federal government, Oil pollution, Municipal wastes, Administrative decisions, Permits.
Identifiers: *Environmental Protection Agency, *Administrative regulations, *Hazardous substances(Pollution), Environmental policy, Effluent limitations, Effluent guidelines, Federal Water Pollution Control Act Amendments of 1972, Fill permit, National Pollution Discharge Elimination System, Non-point sources(Pollution).

In an annual report to Congress, the Environmental Protection Agency (EPA) outlined the mea-

sures taken by the agency in 1973 to implement the objectives of the Federal Water Pollution Control Act. In determining the extent of the nation's water pollution problems, the states and the EPA found about one-third of the nation's classified water segments could meet water quality standards for point source pollution. The water quality has improved in rivers with respect to pollutants receiving the most widespread controls; however, nitrogen and phosphorus pollution has worsened. The EPA made municipal construction grant awards of $3 billion in 1973. Streamlined enforcement procedures have been established under the National Pollutant Discharge Elimination System and stringent restrictions have been applied to individual dischargers. Oil and hazardous substance discharge actions comprised the majority of enforcement proceedings. A study was made of the operations of municipal waste treatment works. A strong research and development program was initiated to increase technical support to the EPA for monitoring and abating pollution. Comprehensive tables list the various activities and actions with which the EPA was involved during 1973. (Cocheu-Florida)
W78-01364

OIL POLLUTION: CLEANING UP THE LEGAL MESS,
Donovan, Donovan, Maloof and Walsh, New York.
For primary bibliographic entry see Field 6E.
W78-01366

INTERVENTION ON THE HIGH SEAS: AN AMERICAN APPROACH EMPLOYING COMMUNITY STANDARDS,
For primary bibliographic entry see Field 6E.
W78-01368

THE APPLICATION OF EFFLUENT LIMITATIONS AND EFFLUENT GUIDELINES TO INDUSTRIAL POLLUTERS: AN ADMINISTRATIVE NIGHTMARE,
For primary bibliographic entry see Field 6E.
W78-01369

AN ANALYSIS OF TECHNICAL AND LEGAL ISSUES RAISED BY THE DEVELOPMENT OF COAL SLURRY PIPELINES,
For primary bibliographic entry see Field 6E.
W78-01370

BERKLEY V. STATE DEPARTMENT OF ENVIRONMENTAL REGULATIONS.
For primary bibliographic entry see Field 6E.
W78-01372

AMERICAN DREDGING CO. V. SELLECK (PERMIT REQUIREMENTS UNDER THE RIVERS AND HARBORS APPROPRIATION ACT OF 1899).
For primary bibliographic entry see Field 6E.
W78-01378

SAVE THE BAY, INCORPORATED V. ADMINISTRATOR OF ENVIRONMENTAL PROTECTION AGENCY (AVAILABILITY OF JUDICIAL REVIEW OF EPA FAILURE TO VETO STATE DISCHARGE PERMIT).
For primary bibliographic entry see Field 6E.
W78-01379

SIERRA CLUB V. TRAIN (ENVIRONMENTAL PROTECTION AGENCY POLLUTION ABATEMENT ORDERS DISCRETIONARY UNDER FWPCA).
For primary bibliographic entry see Field 6E.
W78-01381

WATER POLLUTION CONTROL.
For primary bibliographic entry see Field 6E.
W78-01391

UNITED STATES V. PENNSYLVANIA ENVIRONMENTAL HEARING BOARD (GOVERNMENT CONTRACTOR-OPERATOR OF FEDERAL FACILITIES NOT IMMUNE FROM STATE REGULATION).
For primary bibliographic entry see Field 6E.
W78-01395

EXXON CORP. V. TRAIN (EPA DENIED AUTHORITY TO REGULATE SUBSURFACE DISPOSAL OF WASTES).
For primary bibliographic entry see Field 6E.
W78-01396

INNOVATIVE SOLUTION TO STORM WATER MANAGEMENT PROBLEM.
Public Works, Vol 108, No 9, p 144, September, 1977.

Descriptors: *Storm runoff, *Underground storage, *Construction materials, *Water pollution control, *Urban runoff, Pipes, Storm water, Surface runoff, Storage tanks, Water storage, Retention, Waste water treatment.
Identifiers: Storm water detention tanks, Fiberglass.

Storm water detention facilities were required when the Alexandria Hospital in Virginia decided to expand its parking facilities. VVKR Partnership, an Alexandria firm of architects and engineers, was commissioned to find a solution. The calculated required storage capacity necessary for the 5-acre site was 6,000 cu ft at a 10-yr rainfall intensity and a release rate of 6.4 cfs. Since detention in surface ponds, oversized pipes, concrete chambers, or gravel interceptors was not considered feasible for the site because of problems in construction and maintenance, VVKR investigated the possibility of an underground fiberglass storage tank. Owens-Corning Fiberglass fabricated the 75-ft long, 10-ft diameter tank. The tank, which was shipped in two sections, has a weir-containing junction box at one end to permit the desired release rate of detained storm water. Use of the fiberglass tank resulted in savings in cost and construction time. (Schulz-FIRL)
W78-01413

SEWER PROBLEM BECOMES ASSET.
Water and Wastes Engineering, Vol. 14, No. 10, p 77, October, 1977.

Descriptors: *Urban runoff, *Storm water, *Multi-purpose projects, *Recreation facilities, *Lakes, Erosion control, Reservoir storage, Sewerage, Storm runoff, Engineering structures, Dams, Diversion structures, Waste water treatment.

A storm water management program in western St. Louis County, Missouri, has resulted in the creation of a small recreational lake in Bridgeton City Park. The project was initiated because of problems with flooding and erosion by storm water runoff in the park area. The 1-acre lake was created with an earthen dam and is designed so that storm water is used to maintain an 8-ft permanent depth. Storm water, which may increase in Lake's depth to as much as 12 ft, is slowly released in the sewer system. The storm water retention lake and earthen dam were designed by Kenneth Balk and Associates, Inc. (Schulz-FIRL)
W78-01414

CITY FIGHTS GREASE AND ODOR PROBLEMS IN SEWER SYSTEM.
Public Works, Vol. 108, No. 10, p 74-75, October, 1977.

Descriptors: *Bacteria, *Sewers, *Oil wastes, *Anaerobic digestion, *Microorganisms, Operation and maintenance, Sewerage, Pumping, Nitrogen, Phosphorus, Conveyance structures, Sewage treatment, Waste water treatment.
Identifiers: Sewer cleaning, Burlingame(CA).

Heavy loadings of grease and oil into the 88 miles of sewage collection lines in Burlingame, California, created a need to evaluate alternative means of cleaning lines and lift stations of grease accumulations. Grease-dissolving agents tested included solvents, detergents, enzymes, and other chemical products. The studies indicated that special bacteria cultures from Bower Industries, Inc., (sold under the name DBC Plus Dried Bacteria Cultures) offered the most effective solution to the problem. A pilot study was initiated at two selected pumping stations with average daily flows of 23,000 and 90,000 gal. Of the several bacteria formulas offered by Bower Industries, the type A culture designed for use with domestic sewage was chosen for use. Seven days of heavy application of the culture were required in the initial treatment phase, followed by maintenance doses of 1 lb of culture every three days for the 23,000-gpd station and 3 lbs of culture every three days for the 90,000-gpd station. The cultures, formulated for use with animal and vegetable oils and petroleum derivatives, were added to the pumping stations as a slurry with a water:dry culture ratio of 2:1. A 1-2 hr presoak period is required to fully activate the lyophilized and air-dried cultures. Ammonium phosphate was added to the slurry to insure adequate supplies of nitrogen and phosphorus for the bacteria during the initial heavy cleanup stage. Additional beneficial side effects of the grease removal program included easier servicing of submersible pumps and reduction of odors. (Schulz-FIRL)
W78-01420

A TURN FOR THE BETTER.
Electrical Review, Vol. 201, No. 5, p 31, July, 1977.

Descriptors: *Automatic control, *Operation and maintenance, *Penstocks, *Electrical equipment, Stress relieving, Sewage treatment, Sewers, Waste water treatment, Aeration.

Automatic operation of eight penstocks which control the flow of sewage to aeration tanks at the Beckton waste water treatment plant in North London, England, has been supplied by the Retrofit Division of Rotork Controls Limited. Commissioned by the Thames Water Authority, motorization of the penstocks has reduced from 40 to 6 minutes the time required for closing from fully open position. The more rapid response has produced a better flow balance through the tanks, as well as easier cleaning and maintenance. Push-button control is currently being used for startup, but provisions for future remote control of the system are being made. The Beckton sewage treatment plant is capable of handling a dry weather flow of 250 mgd and a wet weather flow of up to 600 mgd. (Schulz-FIRL)
W78-01434

SYSTEM CONTROLS TREATMENT PLANT.
Instrumentation Technology, Vol. 24, No. 6, p 21, June, 1977.

Descriptors: *Digital computers, *Automation, *Monitoring, *Chemical oxygen demand, *Industrial wastes, Municipal wastes, On-site data collections, Hydrogen ion concentration, Dissolved oxygen analyzers, Chlorination, Treatment facilities, Waste water treatment.
Identifiers: Franklin(OH), Dayton(OH).

The Franklin, Ohio, waste water treatment plant of the Miami Conservancy District has incorporated a digital control system into its facilities. Two MODCOMP computers produced by

Systems Control Inc. of Palo Alto, California, are used to monitor pH, chlorine residual, dissolved oxygen, mixed liquor suspended solids, and primary sludge density. One of the computers is located at the Franklin plant to handle on-site control and monitoring while the second is located at headquarters in Dayton to coordinate operations of up to eight treatment plants. The Franklin plant, with a design capacity of 4.5 mgd and an average loading capacity of 3 mgd, treats combined municipal and industrial wastes for a population equivalent of 200,000. The average daily loading of COD ranges from 70,000 to 100,000 lbs/day. Storing industrial wastes, primarily from four paper mills, the Franklin solid waste recovery plant, and a liquid industrial waste recycling system, are separated from municipal wastes during primary treatment. (Schulz-FIRL)
W78-01442

INNOVATION IN STORM WATER MANAGEMENT.
Civil Engineering-ASCE, Vol 47, No 7, p 20, September, 1977.

Descriptors: *Urban runoff, *Storm water, *Storage tanks, *Construction materials, *Water storage, Storm runoff, Hospitals, Paving, Waste water treatment.
Identifiers: Alexandria(VA).

In construction of additional parking facilities at the Alexandria Hospital, the city of Alexandria, Virginia, also required construction of storm water detention facilities to alleviated runoff problems. The VVKR Partnership of Alexandria was contracted by the hospital to design storage facilities. Calculations indicated that a storage volume of 6000 sq ft would be necessary for the 5-acre site. Conventional methods of storm water detention used in the Washington metropolitan area include surface storage ponds, and below-grade storage in concrete chambers, over-sized pipes, or gravel interceptors. These methods were rejected for the site because of costs, maintenance requirements, and the site topography. A fiberglass tank system was chosen because of its lower costs and construction requirements. Provided by Owens-Corning Fiberglass, the 75-ft diameter tank was shipped in two sections and installed by the Arlington Asphalt Company of Arlington, Virginia. (Schulz-FIRL)
W78-01462

MANAGING SALINE WATER FOR IRRIGATION.
International Center for Arid and Semi-Arid Land Studies, Lubbock, TX.
For primary bibliographic entry see Field 3C.
W78-01492

MODELING THE IMPACT OF STRIP MINING AND RECLAMATION PROCESSES ON QUALITY AND QUANTITY OF WATER IN MINED AREAS: A REVIEW,
Agricultural Research Service, University Park, PA. Northeast Watershed Research Center.
For primary bibliographic entry see Field 5B.
W78-01501

SALINE WATERS-THEIR POTENTIALITY AS A SOURCE OF IRRIGATION,
For primary bibliographic entry see Field 3C.
W78-01506

METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO, DES PLAINES, O'HARE WATER RECLAMATION PLANT AND SOLIDS PIPELINE, VOLUME II. APPENDICES.
Environmental Protection Agency, Chicago, IL. Region V.
For primary bibliographic entry see Field 5D.
W78-01509

PROCEEDINGS OF SANDUSKY RIVER BASIN SYMPOSIUM, HELD AT TIFFIN, OHIO ON MAY 2-3, 1975.
International Reference Group on Great Lakes Pollution from Land Use Activities.
For primary bibliographic entry see Field 5B.
W78-01518

INTRODUCTION TO THE SANDUSKY RIVER BASIN,
Heidelberg Coll., Tiffin, OH.
For primary bibliographic entry see Field 5B.
W78-01519

ENVIRONMENTAL DEVELOPMENT PLAN (EDP): HYDROTHERMAL ENERGY SYSTEMS FY 1977.
Energy Research and Development Administration, Washington, DC.
For primary bibliographic entry see Field 4B.
W78-01546

DETERMINATION OF HARMFUL QUANTITIES AND RATES OF PENALTY FOR HAZARDOUS SUBSTANCES,
Battelle-Northwest, Richland, WA. Pacific, Northwest Lab.
G. W. Dawson, M. W. Stradley, and A. J. Shuckrow.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 794, Price codes: A08 in paper copy, A01 in microfiche. Volume II-Technical Documentation, EPA-440/9-75-005-b, October 1974. 155 p, 25 fig, 17 tab, 102 ref. EPA-68-01-2268.

Descriptors: *Water pollution, *Accidents, *Regulation, *Penalties(Legal), *Law enforcement, Econometrics, Resources, Methodology, Value, Cost allocation, Freshwater, Saline water, Lakes, Estuaries, Water quality standards.
Identifiers: *IMCO/GESAMP methodology, DOHM methodology, *Hazardous materials.

Methodologies, which designate specific h penalty derive the value of resources lost. The modified IMCO/GESAMP methodology designates harmful quantities and rates of penalty based on a proposed international hazardous material rating/classification system which has been submitted to the United Nations for adoption. The system is utilized to profile hazardous materials on the basis of their relative hazard potentials, relegating materials to categories, determining critical concentration, and then deriving a harmful quantity and base rate of penalty for each category using the resource value methodology. The penalty rate is then modified for individual hazardous materials by an adjustment factor based on hazard potential properties. The unit of measurement methodology addresses legalities using standard trade practice measurement and fixed monetary guidelines. The Division of Oil and Hazardous Materials (DOHM) methodology uses a simplified plug flow model to assess the quantity of a hazardous material (harmful quantity) which when spilled is capable of inflicting substantial harm to key aquatic organisms in a stream. The rate of penalty is equated to the cost that would have been incurred by the discharger had preventive measures been instituted. Two additional approaches offer locational variables which further refine penalty assessments based on the actual water uses and dispersive capacity of the receiving body. (See also W78-01551 and W78-01553) (Wares-IPA)
W78-01552

DETERMINATION OF HARMFUL QUANTITIES AND RATES OF PENALTY FOR HAZARDOUS SUBSTANCES,
Battelle-Northwest, Richland, WA. Pacific Northwest Lab.
G. W. Dawson, M. W. Stradley, and A. J. Shuckrow.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 795, Price codes: A08 in paper copy, A01 in microfiche. Volume III-Appendices, EPA-440/9-75-005-c. October 1974, 365 p, 14 fig, 9 tab, 167 ref, 15 append. EPA-68-01-2268.

Descriptors: Water pollution, *Water pollution sources, *Regulation, *Statistics, *Mathematical models, *Data collections, Methodology, Cost analysis, Classification, Chemical properties, Saline water, Freshwater, Lakes, Estuaries, Law of the sea, Water quality standards, *Hazardous materials.

The appendices present a brief profile of the physical/chemical and toxicological data employed in navigable waters pollution control to calculate harmful quantities and rates of penalty for designated hazardous substances. Appendix A contains input data for designated hazardous substances. Appendix B describes specific evaluation procedures employed to derive values for volumes of freshwater lakes and surface areas of estuarine systems. Appendix C is a table of intrinsic adjustment factors for the resource value methodology. Appendix D presents mathematical model determination of the total water volume subjected to a critical concentration from a point source spill of a hazardous material. Appendices E and F present IMCO/GESAMP guidelines for profiling and categorizing hazardous materials. Appendix G is a table of IMCO methodology classification of hazardous materials. Appendix H lists hazardous materials by IMCO hazard category. Appendix I is a determination of IMCO methodology adjustment factors for degradability and dispersibility through the use of a DELPHI technique. Appendix J presents the derivation of representative stream flow. Appendix K lists estuarine types and presents a model equation derivation. Appendix L describes derivation of the time at which the minimum harmful quantity is obtained in the plug flow model. Appendix M presents the total cost of prevention adjustment factors. Appendix N lists final harmful quantities and rates of penalty. Appendix O is a glossary of terms. A more detailed discussion on each designated substance and a complete accounting of available toxicological data can be found in the technical document accompanying the designation regulation. (See also W78-01551 and W78-01552) (Wares-IPA)
W78-01553

CONTROL OF THE RIVER SLANA POLLUTION CAUSED BY THE GEMERSKA HORKA PULP MILL (MOZNOSTI OBMEDZENIA ZNECISTOVANIA RIEKY SLANEJ CELULOZKOU V GEMERSKEJ HORKE),
Celprojekt Ruzomberok (Czechoslovakia).
For primary bibliographic entry see Field 5D.
W78-01569

CONTROL OF ENVIRONMENTAL POLLUTION BY PULP AND PAPER INDUSTRY. I. WATER QUALITY PARAMETERS (SOBRE EL CONTROL DE LA CONTAMINACION AMBIENTAL POR VERTIDOS DE LAS INDUSTRIAS DE CELULOSA Y PAPEL. I. PARAMETROS MAS EMPLEADOS DE CALIDAD DE LAS AGUAS),
Instituto Nacional de Investigaciones Agrarias, Madrid (Spain). Dept. de Celulosa e Industrias de Extraccion.
D. Garcia Martin, R. M. Caminos Muruzabal, and C. Garcia Vallejo.
Investigacion y Tecnica del Papel, Vol. 14, No. 52, p 385-406, April, 1977. 29 ref, 3 tab.

Descriptors: *Pulp and paper industry, *Effluents, *Water quality control, *Water quality standards, Legislation, Europe, North America, Water pollution control.

The selection of parameters adequate for controlling the effectiveness of effluent treatment

measures and evaluating the polluting load of effluents is considered, as is the standardization of appropriate methods for measuring these parameters. European and North American legislation specifying those parameters most significant for determining and maintaining acceptable water quality (particularly of receiving streams) is summarized. (Sykes-IPC)
W78-01582

CASES IN THE RELATION OF RESEARCH ON REMOTE SENSING TO THE DECISION-MAKERS IN A STATE AGENCY,
Wisconsin Univ.-Madison. Inst. for Environmental Studies.
For primary bibliographic entry see Field 4A.
W78-01594

DEVELOPMENT DOCUMENT FOR BEST TECHNOLOGY AVAILABLE FOR THE LOCATION, DESIGN, CONSTRUCTION AND CAPACITY OF COOLING WATER INTAKE STRUCTURES FOR MINIMIZING ADVERSE ENVIRONMENTAL IMPACT,
Environmental Protection Agency, Washington, DC. Effluent Guidelines Div.
D. Barnes.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-253 573, Price codes: A12 in paper copy, A01 in microfiche. Report EPA 440/1-76/015-a, April 1976. 272 p, 73 fig, 9 tab, 85 ref, 3 append.

Descriptors: *Cooling water, *Intakes structures, *Environmental effects, Powerplants, Screens, Trash racks, Fish barriers, Structures, Barriers, Intakes, Structural design, Construction, Locating, Fish, Aquatic life, Microbiology, Aquatic microorganisms, Environment.

The Federal Water Pollution Control Act Amendments of 1972 state under Thermal Discharges, Section 316 (b): 'Any standard established pursuant to section 301 or section 306 of this Act and applicable to a point source shall require that the location, design, construction and capacity of cooling water intake structures, reflect the best technology available for minimizing adverse environmental impact.' This document presented the findings of an extensive study of this 'best technology' available: Since the Act specifies cooling water intake structures, this document was addressed specifically to cooling water intakes. It is evident, however, that the general technical discussion could apply to other water intakes, for example, non-cooling water intakes for industrial, irrigation or domestic water supply. (Sims-ISWS)
W78-01647

LAND USE REPORT.
Environmental Protection Agency, Denver, CO. Region VIII.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-257 037, Price codes: A16 in paper copy, A01 in microfiche. December 1, 1972. 355 p.

Descriptors: *Land use, *Pollution abatement, *Air pollution, *Water pollution, Air pollution effects, Water pollution effects, Environmental effects, Solid wastes, Urbanization, Pesticides, Sewage treatment, Agriculture, Water resources, Erosion, Evaluation, Federal Water Pollution Control Act, Governments, Surveys, Planning.
Identifiers: Environmental impact statements.

The report addressed those Environmental Protection Agency (EPA) programs, as they are conducted in Region 8, which have a significant direct or indirect land-use impact. The programs include the Region's air programs, water programs, solid waste programs, pesticides programs, and noise programs, along with a discussion of the Office of Federal Activities, the Environmental Impact Statement Review Division, and the Planning and Evaluation Section. The recommendations which followed each section of the report pertain to the Region 8 EPA's policy as that policy relates to and affects land-use. (Sims-ISWS)
W78-01653

AD HOC ADVISORY PANEL ON EVALUATED PHYSICAL PROPERTY DATA IN AID OF AQUEOUS ENVIRONMENTAL PROBLEMS.
National Academy of Sciences and National Research Council, Washington, DC. Numerical Data Advisory Board.
For primary bibliographic entry see Field 5B.
W78-01654

CONCEPT DEFINITION OF THE ARMY ENVIRONMENTAL TECHNICAL INFORMATION SYSTEM,
Operations Research, Inc., Silver Spring, MD. Space and Communications System Div.
For primary bibliographic entry see Field 10D.
W78-01657

SOME INITIAL AQUACULTURE EXPERIMENTS IN RECIRCULATING WATER SYSTEMS,
Bayerische Landesanstalt fuer Wasserforschung, Wielen (West Germany). Aussenstelle.
M. Bohl.
Aquaculture, Vol. 11, p. 323-328, 1977. 3 tab, 13 ref.

Descriptors: *Aquiculture, *Fish farming, *Carp, *Recirculated water, *Water reuse, *Nitrates, *Nitrites, *Water purification, *Waste water treatment, *Activated sludge, *Sludge treatment, *Sludge disposal, *Organic wastes, *Fish culture.

First experiences in the management of different recirculating water systems were described after discussion of design and specification of purification plants for intensive fish farming. The problem of nitrate and nitrite concentrations in water was also analyzed. Further investigations directed at the improvement of environmental factors and economic organization of fish recirculating systems were advocated. (Katz)
W78-01669

SEPARATORS,
H. H. Murphy.
U.S. Patent No 4,013,561, 8 p, 4 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 956, No 4, p 1381, March 22, 1977.

Descriptors: *Patents, *Water pollution treatment, *Oil pollution, *Oil spills, Industrial wastes, *Separation techniques, Skimming.

A separator is provided for skimming floating materials from a body of water, particularly oxidized or emulsified oils and floating solid materials. The invention comprises a pair or contiguous counter-rotating cylinders having a rought-textured frictional traction surface. The traction surface is sufficiently rough in texture to provide an abrasive-like frictional grip with a contrasting layer of liquid. Advancing the textured surface within the body of water abrades and draws the contracting layer of water and proximate floating materials along the advancing traction surface in passage within or through the body of water, thereby conveying the layer of water and floating materials into the collection reservoir. The conveying traction surface material can range from a very soft cellular elastomer such as a sponge rubber, to very hard materials commonly used as industrial abrasives such as granular metallic carbides and oxides, including tungsten carbide, silicon carbide, and aluminum oxide particles, attached to a base material as in conventional abrasive-coated materials. (Sinha-OEIS)
W78-01692

OIL SEPARATOR,
R. L. Tuttle.
U.S. Patent No 4,014,791, 6 p, 2 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 956, No 5, p 1796, March 29, 1977.

Descriptors: *Patents, *Oil pollution, *Water pollution control, *Separation techniques, Water quality control, Oil-water interfaces, Equipment.

Oil separation is achieved by injecting the combined fluids into the interior of a closed vessel and directing the flow against a series of baffles which cause the flow to be directed back against itself in such a manner that the initial upward component of flow is substantially nullified so that separated oil flows rapidly to the top of the vessel and separated water flows rapidly to the bottom. Upward flow is directed first against a concave surface which directs the flow back downward into a conically shaped collar which again reverses the flow upward and outward wherein substantial portions of the flow are directed back against themselves which seems to cause rapid separation of the oil particles from the water. Separation is further enhanced by maintaining all of the fluid under positive pressure, and by sensing the location of the oil-water interface, the withdrawal rates of the oil and water are separately controlled so as to maintain a constant pressure even though the relative oil concentration may vary over a considerable range. (Sinha-OEIS)
W78-01700

6. WATER RESOURCES PLANNING

6B. Evaluation Process

FEDERAL WATER RESOURCES MANAGEMENT: THE ADMINISTRATIVE SETTING,
Resources for the Future, Inc., Washington, DC.
For primary bibliographic entry see Field 6E.
W78-01499

THE RAJASTHAN CANAL PROJECT,
For primary bibliographic entry see Field 3F.
W78-01505

WATER PROBLEMS IN SOUTHWEST ASIA,
Durham Univ. (England).
P. Beaumont.
In: Problems in the Development and Conservation of Desert and Semidesert Lands, Twenty-Third International Geographical Congress, Working Groups on Desertification in and Around Arid Lands, Pre-Congress Symposium, Ashkhabad, U.S.S.R., July 20-26, 1976, p 105-110. 9 ref.

Descriptors: *Water resources development, *Projects, *Project benefits, *Project planning, *Asia, Multiple-purpose projects, Costs, Project feasibility, Economic feasibility, Arid lands, Cities, Comprehensive planning, Natural resources, Political aspects, Urbanization, Water requirements, Water utilization, Semi-arid climates, Desalination plants, Regions, Population, Agriculture, Industries.
Identifiers: Middle East, Southwest Asia.

High population growth and associated urbanization in Southwest Asia have required the development of water resources projects to meet essential needs rather than for increasing the productive capacity of agriculture and industry. A small number of large reservoir dam projects have been chosen for propoganda purposes and because of the preferences of major international aid-awarding bodies. Actual benefits of these projects have rarely lived up to expectations, due in part to a lack of detailed hydrological observations, underestimation of soil erosion rates in the catchments above major dams, and lack of an

adequately trained and financed agricultural extension service. Consequently, large water resource development schemes have fallen into disfavor in many parts of the region. In the region's more arid countries, such as Kuwait and Saudi Arabia, large sums of money have been spent on desalination plants. If population growth is not soon checked, future projects will have to be developed just to maintain present living standards. Future projects will be very expensive and costs will inevitably be borne by agriculture and industry, which are soon expected to compete in world markets. (Ullery-Arizona)
W78-01508

NEW CASTLE COUNTY DELAWARE RIVER SHORELINE STUDY,
Delaware Univ., Newark. Dept. of Economics.
R. Agnello, L. Donnelley, R. Kirk, P. Jensen, and C. Brine.
College of Marine Studies, Sea Grant Report No. DEL-SG-18-77, (1977) 201 p. Final Report prepared for New Castle County Department of Parks and Recreation.

Descriptors: *Recreation, *Shores, *Rivers, *Land use, *Recreation facilities, Delaware, Sociology, Water resources, Resources development.
Identifiers: Resources management, *Delaware River shoreline.

The final report of the Delaware River Shoreline Study is made up of six sections. Task I is a review and analysis of water-based recreation demand based on existing studies. Task II is a literature survey of water-based recreation facilities in other urban areas of the nation. Task III is an evaluation of shoreline locations for their suitability as water-based recreation sites. Task IV is a synthesis of the results of the three previous tasks into a set of five recreation development scenarios. These scenarios are not recommendations but are alternatives to be evaluated in a public survey. Task V is a report on the workshop held to discuss progress on Tasks I - IV. Task VI presents and analyzes the survey results. (NOAA)
W78-01535

LUMIS-A LAND USE MANAGEMENT INFORMATION SYSTEM FOR URBAN PLANNING,
Caltech Jet Propulsion Lab., Pasadena, CA.
For primary bibliographic entry see Field 4A.
W78-01596

SATELLITE INFORMATION ON ORLANDO, FLORIDA,
Brevard County Planning Dept., Titusville, FL.
For primary bibliographic entry see Field 4A.
W78-01597

REMOTE SENSING IMPACT ON CORRIDOR SELECTION AND PLACEMENT,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 7C.
W78-01598

IMPROVED RESOURCE USE DECISIONS AND ACTIONS THROUGH REMOTE SENSING,
Michigan State Univ., East Lansing.
R. Hill-Rowley, M. Boylan, W. Enslin, and R. Vlasin.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No. NASA TM-X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 1747-1767, September 1975. 7 fig, 2 tab.

Descriptors: *Decision making, *Resources development, *Michigan, *Remote sensing, Planning, Management, Resources allocation, Appraisals, Property values, Administration, Forest management, Coordination, River basins, Highways, Soil erosion, Sediment control, Data processing, Land classification, Land use, Methodology, Census.
Identifiers: *Case studies.

Michigan State University continues to be engaged in applications of remote sensing to a considerable variety of needs of governmental agencies and private organizations in order to facilitate the operational uses of remote sensing for improving management decisions and actions concerning resource uses. Cumulative experience reveals that operational applications are not all the same and that it is important to distinguish between at least two categories, namely: (1) first generation, or direct-action; and (2) second generation, or indirect, delayed-action applications. Making this distinction is crucial for many reasons, such as justifying proposed undertakings, guidance for research design, methodology requuirements, budget allocations, and many others. From among applications completed during 1974-75, seven case studies were offered in illustration of the many contrasts which can be drawn between first and second generation application studies. These include: (1) multi-agency river basin planning; (2) corridor assessment and route location for highway location, together with improvement of county-level planning decisions; (3) improving timber management practices; (4) enforcement of new state statutes; (5) county-wide open space preservation; (6) land value reappraisal relative to property tax equalization; and (7) optimizing agribusiness processing plant locations. In all these applications the user-agency was included as a participant in order to maximize understanding of the processes whereby information and findings are derived, allowing the progressive formulation of tentative decisions, and generating early anticipation of what actions might need to be taken as well as discerning other possible uses for the information. (See also W78-01589) (Humphreys-ISWS)
W78-01599

DEVELOPMENT OF USER APPLICATIONS FOR EARTH RESOURCES SURVEY DATA IN URBAN AND REGIONAL PLANNING IN THE PUGET SOUND AREA,
Washington Univ., Seattle.
For primary bibliographic entry see Field 4A.
W78-01600

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

AN ANALYSIS OF CONSTRUCTION COST EXPERIENCE FOR WASTEWATER TREATMENT PLANTS.
Environmental Protection Agency, Washington, DC.
For primary bibliographic entry see Field 5D.
W78-01463

ECONOMICS OF TRANSPORTING WASTEWATER SLUDGE,
Environmental Protection Agency, Denver, CO. Region VIII.
For primary bibliographic entry see Field 5E.
W78-01470

6D. Water Demand

INDIAN WATER RIGHTS IN THEORY AND PRACTICE: NAVAJO EXPERIENCE IN THE COLORADO RIVER BASIN,
California Univ., Los Angeles.
For primary bibliographic entry see Field 6E.
W78-01360

WATER PROBLEMS IN SOUTHWEST ASIA,
Durham Univ. (England).
For primary bibliographic entry see Field 6B.
W78-01508

NEW CASTLE COUNTY DELAWARE RIVER SHORELINE STUDY,
Delaware Univ., Newark. Dept. of Economics.
For primary bibliographic entry see Field 6B.
W78-01535

6E. Water Law and Institutions

INTERNATIONAL FIELD YEAR FOR THE GREAT LAKES.
National Oceanic and Atmospheric Administration, Rockville, MD.
For primary bibliographic entry see Field 2H.
W78-01187

PROCEEDINGS OF THE FEDERAL INTER-AGENCY SEDIMENTATION CONFERENCE, BUREAU OF RECLAMATION, DENVER, COLORADO, MAY 6-8, 1947.
For primary bibliographic entry see Field 4D.
W78-01188

WHITHER POLLUTION CONTROL,
For primary bibliographic entry see Field 5G.
W78-01220

WATER RESOURCES - THE PRODUCTIVE CONTRIBUTION OF POLLUTION CONTROL,
For primary bibliographic entry see Field 5G.
W78-01221

POLLUTION CONTROL AND LEGISLATION IN THE FEDERAL REPUBLIC OF GERMANY,
For primary bibliographic entry see Field 5G.
W78-01224

POLLUTION CONTROL AND LEGISLATION--THE DUTCH APPROACH,
Public Health and Environmental Protection (Netherlands).
For primary bibliographic entry see Field 5G.
W78-01225

WASTE TREATMENT IN THE DANISH DAIRY INDUSTRY,
Statens Forsoegsmejeri, Hillerod (Denmark).
For primary bibliographic entry see Field 5D.
W78-01255

NEED TO CONTROL DISCHARGES FROM SEWERS CARRYING BOTH SEWAGE AND STORM RUNOFF (RPT. TO THE CONGRESS).
Comptroller General of the United States, Washington, D.C.
For primary bibliographic entry see Field 5G.
W78-01281

STATE HAS TITLE TO FORESHORES OF GEORGIA'S NAVIGABLE WATERS,
D. Beigh.
Mercer Law Review, Vol. 27, No. 4, p. 1229-36, Summer 1976.

Descriptors: *Georgia, *Navigable waters, *Shores, *Accretion(Legal aspects), *Intertidal areas, Low water mark, Water rights, Boundaries(Property), Riparian rights, Legal aspects, High water mark, Land tenure, Real property, Tidal marshes, Non-navigable waters, Ownership of beds, Seashores, Watercourses(legal aspects), Legislation, Tidal waters, Public lands.
Identifiers: Foreshore.

In State v. Ashmore, the Georgia Supreme Court held that the State has fee simple title to the foreshore of all navigable waters. In tracing the history of such ownership, the author found that although several states allow private ownership of the foreshore to the low water mark, Georgia has always held that the state owned the foreshore up to the high water mark. Title could only be extended through specific legislation. In this case, the Ashmores contended that such a provision had been made. However, the supreme court decided it was not the intention of either the 1902 Act or Constitutional Commission of 1943-44 to extend the title of landowners adjacent to tidewaters to the low water mark. The court's decision was narrow since it applied only to navigable waters. The author concludes that although it was a landmark decision it was disappointing because that distinction between navigable and non-navigable waters leaves open the question of ownership of Georgia's marshes. In addition, the court's failure to limit the legislature's power to gratuitously convey portions of the foreshore leaves no guidelines to determine the validity of any future grants of foreshore. (Maass-Florida)
W78-01348

WATER RESOURCE POLICY STUDY.
Water Resources Council, Washington, DC.
For primary bibliographic entry see Field 5G.
W78-01349

IS CONGRESS PROTECTING OUR WATER. THE CONTROVERSY OVER SECTION 404, FEDERAL WATER POLLUTION CONTROL AMENDMENTS OF 1972,
Environmental Protection Agency, Washington, DC. Office of General Counsel.
For primary bibliographic entry see Field 5G.
W78-01350

PROCEEDINGS OF THE FIRST FEDERAL CONFERENCE ON THE GREAT LAKES, HELD AT ANN ARBOR, MICHIGAN, DECEMBER 13-15, 1972.
National Environmental Research Center, Grosse Ile, MI. Grosse Ile Lab.
For primary bibliographic entry see Field 5G.
W78-01351

U.S., CUBA AGREE ON MARITIME BOUNDARIES AND FISHERY MATTERS.
Department of State Bulletin, Vol 76, No 1983, p. 686-87, June 27, 1977.

Descriptors: *International law, *Fish harvest, *Commercial fishing, *International waters, Marine fisheries, Oceans, United States, Zoning, Fishing, Boundary disputes, Legal aspects, Water law, Treaties, Foreign waters, Commercial fish, Fish, Fish conservation, Harvesting.
Identifiers: Coastal waters, International agreements, Water rights(Non-riparian), Territorial waters, Cuba, Fishing zone, Marine environment, Marine resources. Vessels.

The Governing International Fishery Agreement between the United States and Cuba has been concluded in accordance with the requirements of the Fishery Conservation and Management Act of 1976 which established a 200-mile fishing zone off the coasts of the United States. The Agreement does not guarantee to Cuban vessels a right to fish, but provides the means by which Cuba may apply for permits which would allow fishing up to a level specified by federal authorities for those fish which have been identified as surplus fish above the harvesting capacities of United States vessels. Until the agreement has been approved by Congress, no permits for Cuban vessels will be issued and no Cuban fishing will be allowed inside the United States fishing zone. The two countries also established a preliminary maritime boundary approximately halfway between the United States and Cuba. It begins at the trijunction point equidistant from the nearest coastal points of the United States, Cuba, and the Bahamas, and extends westward. A map of the line accompanies the text. A final boundary determination must be accomplished by treaty. (Hammersley-Florida)
W78-01352

SPILL CLEANUP--WHAT ARE THE CAPABILITIES.
For primary bibliographic entry see Field 5G.
W78-01353

SECTION 404: A CONTROVERSIAL PROGRAM THAT GREW LIKE TOPSY,
For primary bibliographic entry see Field 5G.
W78-01354

COASTAL RESOURCE USE - DECISIONS ON PUGET SOUND,
Washington Univ., Seattle. Sea Grant Program.
For primary bibliographic entry see Field 6G.
W78-01355

BUREAU OF OUTDOOR RECREATION LOOKS AT WATER QUALITY,
Bureau of Outdoor Recreation, Washington, DC. Office of Communications.
For primary bibliographic entry see Field 5G.
W78-01356

WASHINGTON SCENE (PROPOSED AMENDMENTS TO THE FEDERAL WATER POLLUTION CONTROL ACT),
B. Kravetz.
Parks and Recreation, Vol. 12, No. 2, p. 12-13, February 1977.

Descriptors: *Legislation, *Water pollution control, *Navigable waters, *Dredging, Federal Water Pollution Control Act, Water quality, Water law, Wetlands, Land use, Land development, Land reclamation, Water resource development, Legal aspects, Jurisdiction, Controlled drainage, Water rights, Water quality control, Pollution abatement, Water permits, Water zoning, Water conservation.
Identifiers: *Fill permits, *Federal Water Pollution Control Act Amendments of 1972, Environmental policy, Congressional hearings, Coastal waters, Navigability tests.

The amendments introduced by the 94th Congress to the Federal Water Pollution Control Act included the Breaux amendment which strictly limited the Army Corps of Engineers' regulatory program for dumping dredge and fill materials in wetlands, lakes and streams. Because a court decision had greatly expanded the definition of navigable waters, many feared the Corps would have too much authority. The amendment limits the Corps' jurisdiction to those waters below the high water mark which are now or could be used to transport interstate or foreign commerce. Supporters of the amendment argue that it merely restores the historic definition of navigable waters, while those opposing it contend it drastically reduces the most effective defense against destruction of irreplaceable wetlands. The Wright amendment, which modified the Breaux amendment, restricts the Corps' authority to issue permits only to commercially navigable waters, adjacent wetlands and coastal wetlands. It passed in the House, but the Senate's response was a proposal retaining broad jurisdiction, but splitting the program between the Corps and the Environmental Protection Agency. The 95th Congress plans to undertake a full scale review of the water pollution control act. (Maass-Florida)
W78-01357

PRIVATE COMPENSATION FOR OIL POLLUTION: FLORIDA'S PRACTICAL SOLUTION,
K. Katz.
University of Florida Law Review, Vol. 27, No. 2, p. 546-59, Winter 1975.

Descriptors: *Oil pollution, *Florida, *Compensation, *Public rights, Coasts, Shores, Disasters, Legislation, Water pollution, Water pollution sources, Oil spills, Legal aspects, Economic impact, Administrative agencies, Legal review, Penalties(Legal), Pollution taxes(Charges), Water law, Federal government, Judicial decisions, State governments.
Identifiers: *Water Quality Improvement Act, Administrative regulations, Citizen suits, Liability, Standing(Legal), Tankers, Vessels.

Florida's Oil Spill and Pollution Control Act of 1971 recognizes the state's seacoast as an asset of high priority. While the 1971 act theoretically provided a private plaintiff with a cause of action against oil pollutors, various allowable defenses made recovery practically impossible. A 1974 amendment to the act rectified the problem by allowing private plaintiffs to recover directly from a fund specifically established to offset pollution damage upon the presentation of a sworn claim stating the amount of damages and the person responsible. The claim is submitted to arbitration and awards are payable directly from the pollution fund. Disadvantages of the proposed scheme include: a waiver of all other remedies upon the presentation of a claim for arbitration; waiver of damages omitted in the claim; the fact that any settlement is binding on the parties and not subject to collateral attack; and finally, a twelve-month time limit after the action arises for presentation of the claim. Although the private individual may still bring a separate judicial action, stringent restrictions on standing to maintain public nuisance actions may well dictate use of the administrative procedure. The amended Florida law should be commended for providing a most practical and simplified route to adequate personal compensation for oil pollution damage. (Moorhouse-Florida)
W78-01358

EUTROPHICATION: A THREAT TO NEW HAMPSHIRE'S LAKES AND PONDS - WHAT LEGAL TOOLS ARE AVAILABLE FOR PROTECTION,
Southern Rockingham Regional Planning District Commission, Salem, NH.
For primary bibliographic entry see Field 5G.
W78-01359

INDIAN WATER RIGHTS IN THEORY AND PRACTICE: NAVAJO EXPERIENCE IN THE COLORADO RIVER BASIN,
California Univ., Los Angeles.
M. E. Price, and G. D. Weatherford.
Law and Contemporary Problems, Vol 40, No 1, p 97-131, Winter, 1976.

Descriptors: *Colorado River Basin, *Indian reservations, *Water allocation(Policy), *Competing uses, *Water supply, Public lands, State governments, Federal government, Governmental interrelations, Administrative agencies, Distribution, Legal aspects, Preferences(Water rights), Water demand, Dams, Economic efficiency, Planning, Prior appropriation, Water law, Beneficial use, Legislation.
Identifiers: *Indian tribes.

Construction of major dam projects in the Western States requires a re-examination of Indian water rights. Roughly analogous to the nineteenth century problem of Indian land rights, the twentieth century issue of Indian water rights has shifted from water ownership to its best use. Conflicts exist between the western water law of prior appropriation and the Indian rights to the water. The United States Supreme Court addressed the issue in Winters v. United States by holding that the Indian rights controlled over state law. However, the standard for measuring the quantity of water reserved to the Indians was not

determined, subsequently causing much conflict. Although the Winters doctrine grants rights to the American Indian the extent to which those rights may be exercised depends upon a number of factors, such as Congressional support, judicial consistency and differing conceptions of reservation purposes and goals. Additionally, Indian interests must be represented before intergovernmental bodies making resource allocation decisions which has not happened in the past. Unless protective action is taken, early-priority Indian water rights may vanish in the face of urban and agricultural development in the West. (Moorhouse-Florida)
W78-01360

SPILL PREVENTION AND CONTROL: A SPECIAL REPORT,
Goodyear Tire and Rubber Co., Akron, OH. Chemigum Plant.
For primary bibliographic entry see Field 5G.
W78-01361

GENERAL IRRIGATION PROJECT REGULATIONS (OPERATION AND MAINTENANCE).
Bureau of Indian Affairs, Washington, DC.
Federal Register, Vol 42, No 114, p 30361-68, June 14, 1977.

Descriptors: *Irrigation, *Irrigation practices, *Irrigation operation and maintenance, *Indian reservations, Water rights, Ditches, Water requirements, Irrigation programs, Right-of-way, Leaching, Irrigation districts, Irrigation water, Water contracts, Water management(Applied), Water delivery, Imported water, Distribution systems, Water resources, Regulation, Domestic water, Stock water, Farm units, Structures.
Identifiers: *Administrative regulations, *Water rights(Non-riparians), Groundwater management, Indians.

The Bureau of Indian Affairs has updated and consolidated its existing regulations governing the operation and maintenance of Indian Irrigation Projects. In general, greater flexibility in project operation is provided for the officer-in-charge. That officer shall establish the irrigation season, and decide whether the carrying of domestic and stock water in the project irrigation system will be detrimental to the system. The definition of 'farm units' for the purpose of receiving water is variable between different projects and is based upon the acreage involved. In the interest of health and sanitation the disposal of sewage and trash in project waterways is prohibited. Regulations also govern distribution and apportionment of water; surface drainage; delivery points; carriage agreements and water rights applications; excess water; leaching water; delivery of water; and application for and record of deliveries of irrigation water. (Brightman-Florida)
W78-01362

CLEAN WATER (REPORT TO CONGRESS, 1974).
Environmental Protection Agency, Washington, DC.
For primary bibliographic entry see Field 5G.
W78-01363

CLEAN WATER, REPORT TO CONGRESS-1974.
Environmental Protection Agency, Washington, DC.
For primary bibliographic entry see Field 5G.
W78-01364

DESIGNATION OF NEW RIVER SEGMENT AS A COMPONENT OF THE WILD AND SCENIC RIVERS SYSTEM.
Hearings--Subcomm. on National Parks and Recreation--Comm. on Interior and Insular Affairs, U.S. House of Representatives, May 6, 1976, Serial No 94-55, 283 p.

Descriptors: *Flooding, *Flood control, *Wild River Act, *Recreation, *Hydroelectric plants, *North Carolina, *Wild rivers, Lakes, Submergence, Hydro-electric power, Federal Power Act, Electric power, Electric power plants, Rivers, Dams, Reservoirs, Archaeology, Environmental effects, Energy, Electric power production, Peak loads.
Identifiers: Administrative regulations, Dam effects, *Energy crisis, Licenses, Wilderness areas, Environmental policy, Property interests, New River(NC).

House hearings on bills to designate 26.5 miles of the New River in North Carolina a component of the Wild and Scenic Rivers System were complicated by the fact that the Federal Power Commission had issued a license to construct a power project which would inundate the area. The Congressional Research Service, however, concluded that Congress might legislate the revocation of a license issued by another Federal agency and that the bills were otherwise constitutional. Proponents of the bills included the Department of the Interior, North Carolina political leaders, North Carolina citizens, and several environmental organizations. They cited the recreational benefits of this stretch of river in its natural state, the alleged inefficiency of the hydro-electric project, the dangers to wildlife, flora, fauna, endangered species and prehistoric sites, the loss of 40,000 acres of agricultural land, and the displacement of 3,000 people. Opponents included Virginia political leaders, the licensee power company, labor organizations, industrialists, and business developers. They claimed the project would generate power efficiently, save fossil fuels, create employment, bolster the area's economy, control floods, and create recreational opportunities on two large lakes. (Jones-Florida)
W78-01365

OIL POLLUTION: CLEANING UP THE LEGAL MESS,
Donovan, Donovan, Maloof and Walsh, New York.
D. L. Maloof.
Insurance Counsel Journal, Vol 43, No 4, p 605-13 (October, 1976).

Descriptors: *Water pollution, *Oil pollution, *Oil spills, *Legislation, Oil wastes, Water pollution sources, Chemical wastes, Oily water, Organic matter, Regulation, Waste water(Pollution), Law enforcement, Water pollution control, Compensation, Damages, Water quality, Local governments, Judicial decisions, Legal aspects.
Identifiers: *Liability, Absolute liability, Coastal waters, State policy.

Oil pollution of the waterways is a growing problem in the United States. The Water Quality Management Act of 1970, enacted to alleviate the problem, provides for cooperation among federal and local governments to clean up oil spills and allows states to create liabilities for damage incurred from oil discharged into state waters. Although a state's right to impose its own standard of liability is not at issue, the desirability of such impositions is questionable since uniformity of law is as vital to the nation and maritime industry as control of oil pollution is to the states. Historically, state regulation of maritime commerce was prohibited under the pre-emption doctrine unless the latter was one of purely local concern. The pre-emption doctrine is discussed in relation to the Water Quality Improvement Act, the Admiralty Extension Act, and the Limitation of Liability Act. Further complicating the problem is the Florida case upholding the state's Oil Spill Prevention Act which imposes strict liability for oil spills. The proposed federal Comprehensive Oil Pollution Liability and Compensation Act of 1975 may be the only solution to the problems caused by piecemeal state legislation. (Maass-Florida)
W78-01366

COASTAL ZONE MANAGEMENT IN HAWAII,
Hawaii State Dept. of Planning and Economic Development, Honolulu.
F. Skrivanek.
Shore and Beach, Vol 45, No 1, p 8-11, January 1977.

Descriptors: *Institutions, *Hawaii, *Shore protection, *Future planning(Projected), *Regulation, Shores, Coastal structures, Management, Coordination, Decision making, Land management, Administration, Comprehensive planning, National seashores, Seashores, Beaches, Public access, Legal aspects, State government, Governmental interrelations, Federal jurisdiction.
Identifiers: *Coastal zone management, Coastal Zone Management Act of 1972, Coastal zones.

Historically, Hawaii has been concerned with the preservation and accessibility of her coastal shores. State legislation enacted to reflect that concern includes provisions for public access and protection of scenic areas. The National Coastal Zone Management Act mandates further state control over the development of coastal areas. This article surveys both state and national legislation and gives the Hawaiian Department of Planning and Economic Developments (DPED) recommendations for best effectuating the legislative policies. Three issues addressed are: the proper location of the inland boundary line; the appropriate organization to coordinate the various programs; and the preferred political institution to choose the areas of particular concern. The author recommends that: (1) the entire state be designated a coastal zone for purposes of planning and administration; (2) an existing agency, preferably the DPED, or a limited new agency be assigned the role of lead agency for coastal zone management; and (3) the State Plan Policy Council be given regulatory responsibilities to designate areas of particular concern in the context of the coastal zone management program. (Curran-Florida)
W78-01367

INTERVENTION ON THE HIGH SEAS: AN AMERICAN APPROACH EMPLOYING COMMUNITY STANDARDS,
W. K. Bissell.
Journal of Maritime Law and Commerce, Vol 7, No 4, p 718-35 (1976).

Descriptors: *International waters, *International law, *Oil spills, *Treaties, *Law of the Sea, Damages, Legislation, Legal aspects, Ships, Pollution abatement, Pollutants, Political constraints, Political aspects, Coasts, Arctic, Arctic Ocean, Water policy, Water quality, Coast Guard regulations, Oil pollution, Oil, Oil wastes.
Identifiers: *Arctic Water Pollution Prevention Act of 1970, *1969 Convention Relating to Intervention on the High Seas, *Oil tankers.

Coastal states have a significant interest in protecting their marine ecosystems from oil spills by large tankers. However, coastal states often must compete with the vessel's flag state for authority to protect their territorial seas from oil spills. The 1969 Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties (Public Law Convention) was convened to solve problems relating to the control and liability aspects of oil pollution. Results of this convention, as well as previous traditional approaches for handling problems relating to various uses of the high seas adjacent to coastal states, are discussed. Unilateral solutions on which states have embarked to preserve their interests, including the British Prevention Act and the Arctic Waters Pollution Prevention Act of 1970, are also presented. The report also describes U.S. implementation of legislation regarding the Public Law Convention and enumerates Coast Guard responsibilities under this legislation. (Josepher-Florida)
W78-01368

THE APPLICATION OF EFFLUENT LIMITATIONS AND EFFLUENT GUIDELINES TO INDUSTRIAL POLLUTERS: AN ADMINISTRATIVE NIGHTMARE,
R. H. Bachmann.
Houston Law Review, Vol 13, No 2, p 348-377 (1976).

Descriptors: *Federal Water Pollution Control Act, *Legislation, *Water pollution control, *Effluents, *Legal aspects, Water quality, Environmental effects, Pollution abatement, Pollutants, Political aspects, Law enforcement, Environmental control, Federal government, Regulation, Economic impact, Technology, Environment, Legal review.
Identifiers: *National Pollutant Discharge Elimination System, *Environmental Protection Agency.

Reviewed here are the 1972 Amendments to the Federal Water Pollution Control Act (FWPCA). Major topics treated include: the National Pollutant Discharge Elimination System (NPDES); technology-related effluent limitations; problems the Environmental Protection Agency (EPA) has had in promulgating regulations and in meeting statutory deadlines; water quality-related effluent limitations; EPA and congressional interpretations that cost should be a factor in setting effluent guidelines; the concept and implications of transferable technology; and judicial review of effluent limitations. The extreme complexity of the Act, compounded by adverse reactions from various public groups, has resulted in many lawsuits against the EPA. These in turn have spawned further regulations and more confusion. Consequently, the EPA has not been able to concentrate on forming a more orderly process under which the FWPCA can work. (Josepher-Florida)
W78-01369

AN ANALYSIS OF TECHNICAL AND LEGAL ISSUES RAISED BY THE DEVELOPMENT OF COAL SLURRY PIPELINES,
N. T. Reed.
Houston Law Review, Vol 13, No 2, p 528-50 (1976).

Descriptors: *Coals, *Water conveyance, *Water importing, *Slurries, *Pipelines, Eminent domain, Water circulation, Political aspects, Legal aspects, Technology, Water permits, Water conservation, Water allocation(Policy), Railroads, Water shortage, Prior appropriation, Water costs, Water policy, Coal mines, Water users, Water utilities, Water yield, Water yield improvement.
Identifiers: *Coal slurry.

Coal slurry pipelines may be the best way to transport western coal to other parts of the country. The recent interest in the slurry pipeline raises legal and technical issues involving environmental concerns, eminent domain grants, railroad pipeline competition, and most significantly, water use. Water and pulverized coal are used in nearly equal proportions to make up the coal slurry. Since water is often scarce in western states, artificial sources of water supply must be found if the coal is to be transported by pipeline. A key legal issue apt to arise will involve the power of a state under its police power to regulate pipeline usage of water. Federal power to regulate in this area might be justified under the broad commerce powers of Congress. (Josepher-Florida)
W78-01370

MAPLE LEAF INVESTERS V. STATE, DEPARTMENT OF ECOLOGY (POWER TO RESTRICT DEVELOPMENT IN A FLOOD CONTROL ZONE).
565 P.2d 1162-66 (Wash. 1977).

Descriptors: *Washington, *Flood plain zoning, *Floodways, *Flood control, Flood damage, Flood plains, Floods, Land use, Land development, Permits, Eminent domain, Waterzoning, Flood protection, Historic floods, Legal aspects, Constitutional law, Damages, Public health, Judicial decisions, Regulation, Legislation.
Identifiers: *Property interests, *Land use controls, State policy, Administrative regulations.

The appellant land developer alleged that an act denying him permission to build single family homes in a flood control zone was unconstitutional. He contended that the act was an invalid exercise of the state's police power as well as taking without just compensation. The statute which the appellant challenged was passed in 1935 to alleviate flood damage to property, natural resources, health and safety. The Supreme Court of Washington, finding that the area in question had a long history of flooding, upheld the denial of the appellant's petition by the regulatory agency and the lower court as a proper exercise of police power. The court also decided that the establishment of a flood control zone along with the enactment of regulations restricting development within a floodway was not a public improvement in the usual sense of the term. The state did not propose to build any facilities or take any action which would increase the water over appellant's property or flood his land. For these reasons the court held that there was no taking. In addition, the regulations did not prohibit all buildings, merely those for residential purposes. (Maass-Florida)
W78-01371

BERKLEY V. STATE DEPARTMENT OF ENVIRONMENTAL REGULATIONS.
347 So. 2d 467-72 (Fla. Ct. App. 1977).

Descriptors: *Florida, *Seawalls, *Landfills, *Permits, Shore protection, State governments, Ecology, Protection, Legal review, Dredging, State jurisdiction, Administrative agencies, Environmental affects, Shores, Public lands, Judicial decisions, Legal aspects, Aquatic habitats, Water quality control, Boundaries(Property).
Identifiers: *Fill permits, Property interests, State policy, Environmental policy, Evidence, Marine ecosystem, Submerged lands.

Petitioner landowner challenged an order by respondent state agency denying his application for a permit to construct a seawall and fill his privately-owned lands. The petitioner's property lay within the boundaries established in 1974 for the Biscayne Bay Aquatic Preserve. No dredging or filling of submerged lands in the Biscayne Bay preserve was allowed except to enhance the quality of the preserve. A subsequent general statute, the Florida Aquatic Preserve Act of 1975, defining preserve boundaries excepted privately-held submerged lands lying landward of established bulkheads. The petitioner contented that under rules of statutory construction the later act superceded prior acts, especially where the later act contained a portion of the particular provisions of the former act. The First District Court of Appeal ruled that the petitioner's property was not subject to the dredge-and-fill prohibition in the Biscayne Bay Aquatic Preserve Act. Even if the act were applicable to the petitioner's property, the court held that the evidence presented demonstrated that the filling project would have enhanced the quality of the preserve. (Cocheu-Florida)
W78-01372

ADJUDICATION OF VESTED WATER RIGHTS; APPROPRIATION OF PUBLIC WATERS (DEFINITIONS AND GENERAL PROVISIONS).
Nev. Rev. Stat. secs 533.010 thru 533.085 (1975).

Descriptors: *Nevada, *Legislation, *Appropriation, *Adjudication procedure, Water rights, Water policy, Beneficial use, Water resources development, Water management(Applied), Preferences(Water rights), Regulation, Water allocation(Policy), Riparian rights, Legal aspects, Water law, Relative rights, Diversion, Eminent domain.
Identifiers: State policy, Property interests.

The water of all sources within the boundaries of Nevada belongs to the public. Subject to existing rights, all such water may be appropriated for beneficial use. Beneficial use is the basis, the measure and the limit of the right to the use of water. Since beneficial use of water is a public use, any person may exercise the right of eminent domain to condemn lands required for the lawful diversion of water. In addition, any person may store water for a beneficial purpose. However, the right to divert water exists only when necessary for a beneficial purpose. Rights to appropriation of water for beneficial purposes may be forfeited by disuse for five consecutive years, but perscriptive rights to use of such water cannot be acquired by adverse possession. A cubic foot of water per second of time is the legal standard for the measurement of water. The quantity of water which may be appropriated is limited to the amount reasonably required for the beneficial use to be served, as determined by the state engineer. Water users owning lands appurtenant to water may rotate the use of the supply to which they are entitled. All maps, surveys and measurements of water are made by a state water right surveyor, appointed by the state engineer. Qualifications for that appointment are listed. (Mulligan-Florida)
W78-01373

APPROPRIATION OF PUBLIC WATERS.
Nev. Rev. Stat. secs 533.325-533.435 (1975).

Descriptors: *Nevada, *Legislation, *Public rights, *Appropriation, Water permits, Water rights, Administrative decisions, Water policy, Beneficial use, Water resources development, Permits, Regulation, Water utilization, Water allocation(Policy), Construction, Water management(Applied), Preferences(Water rights), Priorities, Colorado River.
Identifiers: Groundwater management, Licenses.

Any person or corporation desiring to appropriate public waters in Nevada must apply to the state engineer for a permit. Applications are limited to water of one source and for one purpose. Information required in the application is specified. Notice of filing an application must be published within 30 days and interested persons may protest the granting of the application. All applications require the approval of the state engineer. When endorsing an application, the state engineer must set forth time limitations for the beginning and the completion of construction work, as well as time prior to which the complete application of water to a beneficial use must be made. Periodic work progress statements must be filed and prior to the completion deadline, a statement of proof of beneficial use must be submitted to the state engineer. After satisfactory proof has been made, the state engineer will issue a certificate of appropriation, subject to existing rights. The related fee schedule is listed. (Mulligan-Florida)
W78-01374

UNDERGROUND WATER AND WELLS.
Nev. Rev. Stat. secs 534.010 thru 534A.040 (1975).

Descriptors: *Nevada, *Legislation, *Well regulations, *Groundwater, *Water wells, Well permits, Administrative agencies, Subsurface waters, Wells, Regulation, Permits, Legal aspects, Percolating water, Aquifers, Domestic water, Groundwater resources, Water sources, Artesian wells, Drillers logs, Groundwater basins, Prior appropriation, Beneficial use, Drilling.
Identifiers: Groundwater management.

All underground waters within Nevada state boundaries belong to the public, subject to appropriation for beneficial use only. Ground water basins shall be supervised by either the state engineer or ground water boards. Guidelines for board membership and operation are given. Where necessary,

the state engineer may employ a well supervisor and assistants whose salaries and related expenses shall be paid from well drilling license fees. Water appropriation permit requirements and conditions for sinking wells are covered. Methods of acquisition and forfeiture of rights of appropriation of underground water for beneficial use from an artesian or definable aquifer are specified. Existing water rights are recognized and the state engineer shall adjudicate any claims of vested underground water rights. Rules dealing with forfeiture and abandonment of claims are set forth. The state engineer is authorized to prescribe all necessary rules to administer this chapter. Well drillers' licensing and fee regulations as well as the information required to be kept in their log are established. This chapter does not apply to the development and use of underground water for domestic purposes under certain conditions. (Mulligan-Florida)
W78-01375

COLORADO RIVER RESOURCES.
Nev. Rev. Stat. secs 538.041 thru 538.251 (1975).

Descriptors: *Nevada, *Legislation, *Colorado River, *Water resources development, State governments, Regulation, Administration, Management, Water management(Applied), Administrative agencies, Water policy, Administrative decisions, Interstate rivers, Rivers, Legal aspects, Contract administration, River regulation, Interstate commissions.
Identifiers: Administrative regulations, State policy.

Nevada has created the Colorado River Advisory Commission to advise the Administrator of the Division of Colorado River Resources. Members of the commission are appointed by the governor. Their qualifications, terms of office and guidelines for the commission are set forth. The Administrator collects and organizes all data connected with the Colorado River and represents the state in the negotiation and execution of contracts for power and reclamation projects. However, such contracts are not binding until approved by the governor. The Administrator also cooperates and negotiates with industry, other states and the federal government to obtain for the state maximum benefit from the Colorado river. Procedures governing the lease, sale and contracts of power and water are provided. Revenues derived from the power and water system will be placed in a Colorado River resources fund to defray cost of studies and analysis to develop sources of water and power related to the Colorado River. The Administrator generating machinery and other equipment. Priorities for the disbursement of revenues from the sale of water are given. (Mulligan-Florida)
W78-01376

CALIFORNIA-NEVADA INTERSTATE COMPACT.
Nev. Rev. Stat. sec 538.600 (1975).

Descriptors: *Nevada, *Legislation, *Interstate rivers, *Interstate compacts, State governments, Regulation, Administration, Management, Water management(Applied), Legal aspects, Water policy, River regulation, Rivers, River basin development, River basins, Water resources development, Interstate commissions, Equitable apportionment, Lakes, Watersheds(Basins), *California.
Identifiers: State policy, Administrative regulations.

The major purposes of the California-Nevada Interstate Compact are to promote equitable apportionment of water, governmental cooperation, and future development, use, conservation and control of water within the Lake Tahoe, Truckee River, Carson River and Walker River Basins. Guidelines for the creation, financing and general powers of a California-Nevada Compact Commission are stated. Information regarding storage rights and construction of an overflow weir for Lake Tahoe is given. Allocations and diversion rights for the waters of the Truckee and Carson Rivers are specified. Detailed plans for the distribution of waters of the Walker River are described, including allocations for the Topaz Reservoir and the Walker River Indian Reservation. Waters of the Walker River in excess of allocated amounts shall be administered by a watermaster nominated by the Commission. Both states have the right to develop ground waters and springs within their boundaries if such use does not reduce the water allocated to the other state, and either state may initiate proceedings if it believes its allocation is adversely affected. Violations of this compact shall be investigated by the commission which may take any necessary remedial action including injunctive relief. (Mulligan-Florida)
W78-01377

AMERICAN DREDGING CO. V. SELLECK (PERMIT REQUIREMENTS UNDER THE RIVERS AND HARBORS APPROPRIATION ACT OF 1899).
556 F.2d 180-84 (3rd Cir. 1977).

Descriptors: *Rivers and Harbors Act, *Navigable waters, *Permits, *Floodgates, *Dredging, Tidal marshes, Tidal waters, Federal jurisdiction, Tides, Rivers, Canal construction, State jurisdiction, Common law, Structures, Barriers, Drainage, Ditches, Channel improvement, Administrative agencies, Culverts, Flood control.
Identifiers: Estoppel, Corps of Engineers, Injunctive relief.

Plaintiffs dredging company and municipality sought to prevent enforcement of cease and desist orders issued by the Corps of Engineers for violation of the Rivers and Harbors Appropriations Act of 1899. The plaintiffs began construction after obtaining a state permit to erect floodgates and extend a ditch through the Delaware River estuary. They notified the Corps of their intentions but failed to apply for a federal permit. The Corps subsequently issued cease and desist orders for failure to obtain a permit. The plaintiffs contended that a permit was not necessary because the affected waters were not navigable, that the state permit was sufficient, or that alternatively the Corps should be estopped. The Third District Court of Appeals denied the plaintiffs' request to prevent enforcement. The court held that the construction would affect navigable waters because it would hinder the ebb and flow of the tide. In addition, the court found that the state authority to issue permits was derived from a federal statue that required Corps approval and finally that the Corps could not be stopped because the validity of the state permit was conditioned on issuance of a Corps permit. (Curran-Florida)
W78-01378

SAVE THE BAY, INCORPORATED V. ADMINISTRATOR OF ENVIRONMENTAL PROTECTION AGENCY (AVAILABILITY OF JUDICIAL REVIEW OF EPA FAILURE TO VETO STATE DISCHARGE PERMIT).
556 F.2d 1282-97 (5th Circuit 1977).

Descriptors: *Permits, *Federal Water Pollution Control Act, *Federal jurisdiction, *Waste water(Pollution), Mississippi, Chemical industry, Jurisdiction, Legislation, Pollutants, Pollution abatement, Industrial wastes, Governments, Legal review, Administrative decisions, Discharge(Water), Federal government, Environment, Judicial decisions, Ecology, Administrative agencies, State governments.
Identifiers: *National Pollution Discharge Elimination System, *Private interest groups, *Environmental Protection Agency, Citizen suits, Immunity(Legal aspects), Point sources(Pollution), Federal Water Pollution Control Act Amendments of 1972.

Plaintiff environmental organization sought a declaration that the Environmental Protection Agency (EPA) had unlawfully failed to revoke the National Pollution Discharge Elimination System authority of the Mississippi Air and Water Pollution Control Commission contending that the Commission's approval of a discharge permit for a titanium dioxide plant failed to follow EPA guidelines. The plaintiff also sought a review of the EPA's failure to block the discharge permit through its veto power over state Pollution Discharge Elimination System Commissions. Exercise of the veto requires a clear showing of the state's failure to follow EPA guidelines. Dismissing the petition, the Fifth Circuit Court of Appeals held that while the court had both the authority and obligation to review EPA decisions to withdraw or not to withdraw a state's delegated permit authority, it could not do so in this case since the plaintiff had not sought a complete administrative remedy by requesting the EPA to revoke the Commission's authority. As to review of the EPA failure to veto the permit in question, the court held that was properly a question for Federal District Courts rather than Circuit Courts of Appeals. (Spector-Florida)
W78-01379

UNIVERSITY OF TEXAS MEDICAL BRANCH AT GALVESTON V. UNITED STATES (LIABILITY FOR COST OF WRECK REMOVAL).
557 F.2d 438-55 (5th Cir. 1977).

Descriptors: *Rivers and Harbors Act, *Navigation, *Legislation, *Ships, *Negligence, Transportation, Compensation, Cost repayment, Channels, Navigable waters, Harbors, Legal aspects, Accidents, Water law, Federal government, Judicial decisions, United States, Texas, Damages, Hazards.
Identifiers: *Limitation of Liability Act, Wrecks, *Navigation obstructions, Vessels, Corps of Engineers, Liability, Wreck removal.

In April 1974, an oceanographic research vessel owned by the appellant medical college collided with a tanker in Galveston Bay Channel. The tanker in turn collided with and sank a dredge owned by the Corps of Engineers. The federal government removed the sunken wreck at a cost of $3,000,000 and sued the appellant for removal costs under the Rivers and Harbors Act. The appellant contended that under the 1851 Limitation of Liability Act it was liable only up to $240,000, the value of the vessel. The United States Fifth Circuit Court of Appeals held that the Limitation Act did not apply to negligence suits brought under the Rivers and Harbors Act. It pointed out that in past cases the policy had been to allow the government recovery against negligent parties for removal of wrecks. To allow appellant to invoke the Limitation Act, the court felt, would place the burden of removal upon an innocent party. This would be contrary to past policy as well as unfair. The Limitation Act had never been extended to cover wreck removal expenses, and the court declined to do so here. (Malefatto-Florida)
W78-01380

SIERRA CLUB V. TRAIN (ENVIRONMENTAL PROTECTION AGENCY POLLUTION ABATEMENT ORDERS DISCRETIONARY UNDER FWPCA).
557 F.2d 485-91 (5th Cir. 1977).

Descriptors: *Pollution abatement, *Water pollution control, Federal Water Pollution Control Act, *Administrative decisions, *Waste disposal, Regulation, Jurisdiction, Rivers and Harbors Act, Water pollution, Legal aspects, Alabama, Administrative agencies, Legislation, Water quality standards, Water law, Federal government, United States, Water Quality Act, Effluents, Water policy, Political aspects.

Identifiers: Administrative regulations, Citizens suits, *Environmental Protection Agency, *Federal Water Pollution Control Act Amendments of 1972, Effluent limitations.

Plaintiff environmental group sought to compel the Environmental Protection Agency (EPA) to issue a pollution abatement order against several corporations allegedly discharging refuse into navigable waters in Alabama. The plaintiff maintained that the Federal Water Pollution Control Act Amendments of 1972 required the defendant to issue such an order. The defendant contended that its duty was discretionary. The defendant also argued that the appeal was moot because the Corps of Engineers had brought suit under the Rivers and Harbors Act of 1899 to enjoin the corporations from such discharge. The United States Fifth Circuit Court of Appeals refused to dismiss for lack of mootness but did dismiss for lack of subject matter jurisdiction. The court stated that while under the Rivers and Harbors Act private citizens may force the EPA to perform mandatory duties, those duties imposed by the FWPCAA were discretionary. The court also pointed out that under the FWPCAA the plaintiff could bring suit directly against the polluters to enforce effluent limitation standards. (Malefatto-Florida)
W78-01381

UNITED STATES V. FEDERAL BARGE LINES, INC. (LIABILITY FOR COST OF REMOVING SUNKEN BARGE FROM RIVERBED).
433 F. Supp. 53-7 (E.D. Mo. 1977).

Descriptors: *Barges, *Transportation, *Rivers and Harbors Act, *Navigation, Damages, Mississippi River, Legal aspects, Negligence, Rivers, Dams, Sand bars, Inland waterways, Navigable waters, Compensation, Channels, Federal government, Judicial decisions, Cost repayment.
Identifiers: *Navigation obstructions, Corps of Engineers, Liability, Vessels.

Plaintiff federal government sued defendent towing and cement companies to recover the cost of removing the latter's sunken barge from the Mississippi River. The defendant's towboat was pulling barges upriver through a buoyed channel when one of the barges grounded on an unmarked obstruction, broke loose, and began to drift downstream. The towboat unsuccessfully attempted to recover the barge which eventually sank near a lock and dam administered by the Corps of Engineers. No damage occurred to these structures. The cement company abandoned the barge after an unsuccessful attempt to remove it. Four years later, the federal government had the wreck removed at a cost of $335,000. The United States District Court held that the government must prove the defendant's negligence in order to recover. Since the cause of the wreck was the unknown and unmarked obstruction in the river the court held the defendant was not negligent as a matter of law. The court also found that since the barge owner was not negligent, he had the right to abandon the barge and was not liable for the cost of removal under federal law. (Malefatto-Florida)
W78-01382

UNITED STATES V. OHIO BARGE LINES, INC. (LIABILITY FOR REMOVAL OF BARGES SUNK IN NAVIGABLE RIVERS).
432 F.Supp. 1023-28 (W.D.Pa. 1977).

Descriptors: *Rivers and Harbors Act, *Navigable waters, *Barges, *Cost repayment, Judicial decisions, Ohio River, Legal aspects, Legal review, Rivers, Harbors, Navigation, Navigable rivers, Federal government, Law enforcement, Water law, Legislation, Negligence, Accidents, Safety, Compensation.
Identifiers: Navigability, *Navigation obstructions, Liability, Vessels, Wreck removal.

Defendants barge company and river vessel moved to dismiss plaintiff United States' claim that the defendants had violated the Rivers and Harbors Act of 1899 by causing or permitting three barges to sink in the Ohio River. The government contended that the incident caused an obstruction to navigation in violation of Sections 403 and 409 of the Act. Pursuant to these sections the government claimed that the defendants were obligated to provide or pay for services to remove obstruction. Defendant barge company claimed no cause of action existed within the Third Circuit because the unintentional sinking of a barge creates no in personam rights under section 10 of the Act and a negligently sunken barge is no obstruction. In interpreting the word 'obstruction', the United States District Court, relying on previous case law which broadly interpreted Section 10, held that a barge sunk in any manner in a navigable river is an obstruction. The court further held that the government's power to protect the navigable capacity of rivers implies a right to be reimbursed for protecting the safety of others during the removal of sunken barges. (Mulligan-Florida)
W78-01383

JOHNSON V. MCCOWEN (APPORTIONMENT OF ALLUVION BETWEEN ADJOINING LITTORAL OWNERS).
348 So. 2d 357-61 (Fla. App. 1977).

Descriptors: *Adjacent land owners, *Florida, *Accretion(Legal aspect), Alluvium, *Riparian land, Littoral, Land tenure, Boundary disputes, Legal aspects, Real property, Boundaries(Property), Water law, Shores, Riparian rights, Riparian waters, Surveys, Beds, Ownership of beds, Channels.
Identifiers: *Declaratory judgments, Submerged lands.

The parties to this action are owners of adjoining littoral waterfront lots with an irregular shoreline. The appellants filed a complaint for declaratory judgment claiming that the original lot had increased in area due to natural accretion after the purchase of the lots from a common grantor and, therefore, a portion of the formerly submerged lands was their property. The apportionment of the alluvion desired by the appellants would restrict appellees' access to the waterfront. The Florida First District Court of Appeal upheld the trial court which had preserved to the parties substantially the same relative waterfront as each had at the time of the original conveyance. The aim of all rules as applied to adjoining littoral proprietors on an irregular shoreline is to give each, when possible, a fair and reasonable opportunity of access to the channel and a fair share of the land by giving him a share of the outward line proportional to a share of the line of original shore owned by him. The court said the lay of the upland shore line, the channel direction and the landowners' correlative rights should all be considered. (McPherson-Florida)
W78-01384

REGULATING USE OF OCEAN SHORE.
Ore Rev Stat secs 390.635 thru .760 (1973).

Descriptors: *Shore protection, *Coastal engineering, *Resources development, *Land resources, *Oregon, Legislation, Resources, Land development, Resource allocation, Planning, Water law, Land use, Land management, Landscaping, Oceans, Shores, Coasts, Coastal structures, Permits, Vegetation.

Regulation of improvements on Oregon's ocean shores is necessary to promote the public welfare and to preserve the financial and aesthetic value of such areas. Therefore, permits must be obtained from the State Highway Engineer before improvements may be made. This legislation promulgates standards for improvement permits and mandates the consideration of such things as the public need for conservation or for development of the resources of the area, stability of the area, trends of existing land uses, and the desirability of the land for future development. Permit decisions of the engineer may be appealed to the circuit court. Certain areas on the ocean shore may be zoned for motor vehicle or aircraft use. Furthermore, removal of rocks, sand, minerals or marine growth, other than souveniers or fish or wildlife must be in compliance with state permits. This section does not apply to certain densely vegetated land areas. (Josepher-Florida)
W78-01385

BEAR RIVER INTERSTATE COMPACT.
Idaho Code Ann sec 42-3402 (Supp 1976).

Descriptors: *Idaho, *Interstate compacts, *Interstate commissions, *Interstate rivers, Water resources development, Utah, Wyoming, State jurisdiction, Water allocation(Policy), Water distribution(Applied), Water resources, Domestic water, Water supply development, Water contracts, Reservoir storage.
Identifiers: *Bear River Compact(Idaho-Wyo-Utah).

Idaho has ratified the Bear River Compact along with Utah and Wyoming. The major purposes of the compact are to: eliminate controversies over the distribution and use of the waters of the Bear River; provide for efficient use of its waters; permit development of the waters of the Bear River; and promote interstate comity. An interstate administrative commission is created and empowered to: promulgate regulations consistent with this compact; conduct property transactions; enforce this compact; contract, sue and be sued; and cooperate with state and federal agencies in matters relating to water pollution of interstate significance. This compact specifies limitations on the states' rights to direct flow water. Storage rights for existing reservoirs are quantified and reserves for irrigation are designated. Uses of water for farm and ranch domestic, and stock watering purposes are allowed without deduction from specified allocations. The participating states and the United States shall have the right to construct or use water works in each of the states. Stored water, or water from another watershed may be turned into the channel of the Bear River in one state and a like quantity and quality may be taken out of the Bear River in another state. (Josepher-Florida)
W78-01386

ADJUDICATION OF WATER RIGHTS.
Idaho Code Ann. secs 42-1401 thru 1413 (1948), as amended, (Supp 1976).

Descriptors: *Idaho, *Water rights, *Adjudication procedure, *Legislation, *Prior appropriation, Priorities, Beneficial use, Water policy, Irrigation water, Irrigated land, Irrigation permits, Water utilization, Water permits, Water management(Applied), Water law, Water allocation(Policy).
Identifiers: *Appurtenant rights.

Idaho has enacted legislation providing that district courts, in adjudicating water rights, shall allot the waters of any stream according to the rights and priorities of those using the waters. Such allotments shall be made to the beneficial use to which the water is applied. Water rights which are applied to irrigational uses shall be appurtenant to the land irrigated. Appurtenant water rights shall pass with the conveyance of the attached land. Allocations for beneficial uses shall never be in excess of amounts used for beneficial purposes. Adjudication procedures for determining priority of rights to use of any state water system are described. Both private parties and the state department of water resources are authorized to bring suits to determine water rights. Furthermore, the department of water resources is vested with

power to investigate and evaluate claims filed. Its reports are filed with the district court. Court decrees shall be conclusive of the disputed rights of all existing claimants with any water user who has been joined but fails to appear and prove his claim barred from asserting rights adjudicated within the entered decree. (Josepher-Florida)
W78-01387

WATER IMPROVEMENT DISTRICTS.
Ore Rev Stat Ann secs 552.013 thru .438 (1973).

Descriptors: *Legislation, *Oregon, *Water districts, *Water management(Applied), *Governmental interrelations, Project planning, Public lands, Public benefits, Public utility district, Water contracts, Wafer conservation, Water policy, Water delivery, Water costs, Water control, Water resources development, Water rates.

Oregon has enacted legislation creating water districts whose purpose is to prevent flood damage and to improve agricultural and other uses of land and water in the public interest. Land owners in areas of one thousand acres or more may petition for the creation of a district. Elected boards of directors manage the districts and promulgate their rules. The districts constitute governmental subdivisions of the state. As such, they have powers to condemn, purchase and accept grants of land, contract for the operation of public works, undertake necessary construction projects, appropriate and acquire water rights, and otherwise act in the interest of the district. Water rates for domestic, industrial, and municipal purposes are fixed by the district. Furthermore, land designated for recreational purposes must also serve some other use in furtherance of irrigation, flood control, or water development. Finally, certain district engineering plans must be approved by the state, with open bidding and public hearings to be held regarding these engineering plans. (Josepher-Florida)
W78-01388

DRAINAGE AND FLOOD CONTROL (GENERAL PROVISIONS).
Ore. Rev. Stat. secs 549.010 thru .990 (1973).

Descriptors: *Legislation, *Oregon, *Flood control, *Water management(Applied), *Drainage programs, Federal government, Assessments, Cost allocation, Flow control, Property values, Project benefits, Project planning, Repairing, Local governments, Drainage, Drainage water, Dam failure, Dam construction, Dams, Dikes, Flood protection, Drainage districts, Drainage practices, Drainage area.

Oregon has enacted legislation giving county governments discretionary authority to contract with the federal government for federally-financed flood control projects. Landowners requiring drainage of their land may apply to the county court for permission to construct means of drainage over adjacent lands. Costs and damages to the lands affected are assessed against the applicant. Owners of land west of the Cascade Mountains may petition the county to drain such lands or improve natural drainage courses. Property owners who benefit from a common dike may make necessary repairs to the dike and recover reasonable costs in the event the contiguous property owner refuses to repair. The State Water Resources Board is authorized to acquire property and enter into contracts regarding desirable federal flood control projects. The state waives its immunity to suit. Counties with populations over 50,000 persons are given broad discretion in carrying out and contracting for water conservation and flood control projects. (Josepher-Florida)
W78-01389

STATE WATER RESOURCES BOARD (PURPOSE AND POWERS).
Ore Rev Stat secs 536.210 thru .490 (1973).

Descriptors: *Oregon, *Legislation, *Water policy, *Beneficial use, *Water resources development, Water rights, Water quality, Water management(Applied), Economic justification, Economic feasability, Conservation, Drainage effects, Water resources, Legal aspects, State governments, Priorities.

Oregon has enacted legislation which recognizes that it is in the public interest to develop and enforce a coordinated state water resources policy. Such a policy should secure maximum beneficial use of both existing and additional water supplies. A board is created to evaluate existing water resources and to formulate plans which augment and conserve such resources. Various policies to be considered by the board in formulating its plans include: regard for existing water rights and priorities; recognition that a coordinated water policy should be achieved for the maximum economic development of the state; regard for possible harmful effects resulting from drainage; and a preference for consumptive uses over mutually exclusive conflicting uses. The board shall classify water sources as to their highest and best use. Procedural guidelines delineating the board's duties with regard to other state and federal agencies are also detailed. (Josepher-Florida)
W78-01390

WATER POLLUTION CONTROL.
Ore Rev Stat secs 468.005 thru .075, 468.700 thru .997 (1973).

Descriptors: *Oregon, *Water quality control, *Legislation, *Water pollution control, *Water policy, Wastes, Effluents, Water rights, Water pollution, Water resources, Damages, Water policy, Waste water, Waste disposal, Water, Legal aspects, Oil spills, Oil wastes, Permits, Ships, Federal Water Pollution Control Act.

Oregon has enacted legislation to carry out its policy of conserving the waters of the state and of preventing and abating water pollution. This chapter creates a commission to enforce policy provisions and to perform all necessary acts. Effluent limitations for discharges into state waters are required to meet the guidelines set forth in the Federal Water Pollution Control Act. Water quality and purity standards should be set after consideration of several factors set forth in the act. Permits are required for the dumping of sewage and wastes into state waters, and persons who negligently or intentionally spill oil from ships or offshore facilities into state waters are made strictly liable for resultant damages to persons and property. (Josepher-Florida)
W78-01391

WYANDOTTE ORCHARDS, INC. V. OROVILLE-WYANDOTTE IRRIGATION DISTRICT (WATER ALLOTMENT FOR ENTIRE ACREAGE RATHER THAN DEVELOPED LAND).
123 Cal. Rptr. 135-41 (Cal. App. 1975).

Descriptors: *California, *Water contracts, *Water rights, *Irrigation districts, Contracts, Supply contract, Water users, Flow, Boundaries(Property), Water supply, Pipes, Water allocation(Policy), Water law, Legal aspects, Judicial decisions, Irrigated land, Regulated flow, Relative rights, Water policy.
Identifiers: Declaratory judgments.

Plaintiff landowner sought declaratory relief against defendant irrigation district. The action was based on an alleged contractual entitlement to water. Before 1922 an agreement was executed between the landowner and two water companies. Under this agreement the quantity to be supplied was twenty-five California miner's inches continuous flow annually. In 1922 the defendant took over the water service from these two companies. At that time landowners whose lands were outside the boundaries of the new district filed a protest because they feared they would be left without adequate protection as to future flow and rates. As a result the defendant district then agreed to supply 'present water users' with one inch of water for each four acres of land. In this action, the plaintiff claimed entitlement to water for his entire acreage. The defendant sought to limit the acreage to that portion developed at the time of the agreement. The California Third District Court of Appeal affirmed the trial court, holding that the phrase 'present water user' referred to the entire acreage of the water customer at the time of the takeover rather than the developed portion of the acreage. (Petruff-Florida)
W78-01392

ENVIRONMENTAL DEFENSE FUND, INCORPORATED V. STAMM (ADEQUACY OF FINAL ENVIRONMENTAL IMPACT STATEMENT).
430 F. Supp. 664-68 (N.D. Cal. 1977).

Descriptors: *Water allocation(Policy), *Water management(Applied), *Project planning, *Water delivery, *Water sources, Aquatic animals, Fish, Aquatic life, Aquatic environment, Aquatic habitats, Projects, Management, Governments, Decision making, Administrative agencies, Water resources development, Canals, Legal aspects, Water law, Return flow, Transportation, Reservoirs, Water quality, Non-structural alternatives, Judicial decisions.
Identifiers: Groundwater management, Private interest groups, *Environmental impact statements, Injunctive relief, Private interest groups, Standing(Legal), Administrative regulations, Evidence, Water rights(Non-riparians), Citizen suits.

Plaintiff environmental groups sought to enjoin defendant federal agency from proceeding with the San Felipe Division of the Central Valley Project which would transport large quantities of water from northern to southern California. The plaintiffs contended that the Final Environmental Impact Statement (EIS) for the proposed project was inadequate on the grounds that: (1) it failed to adequately consider the negative effects of the project on the water quality of the area proposed as the source of the water to be transported; (2) it did not adequately discuss alternatives to the proposed project; (3) it was deficient in dealing with seismic and safety problems relating to a particular dam and reservoir proposed by the project; and (4) it failed to adequately consider the negative impact upon the Pajaro River, its fish and surrounding groundwater. The United States District Court denied the injunction. The court said the purposes of an EIS are to enable decision makers to consider a project with full awareness of the environmental consequences, to inform the public, and to encourage public participation in information development. The court found the project EIS adequate since it fulfilled these purposes. (Brightman Florida)
W78-01393

WARM SPRINGS DAM TASK FORCE V. GRIBBLE (ADEQUACY OF ENVIRONMENTAL IMPACT STATEMENT).
431 F. Supp. 320-24 (N.D. Cal. 1977).

Descriptors: *Environmental effects, *Dam construction, *Earth dams, *Water quality, Archaeology, Flood control, Water supply, Recreation, California, Environmental engineering, National historic sites, Earthquakes, Earthquake engineering, Reservoirs, Faults(Geologic), Water law, Judicial decisions, Legislation, Impounded waters, Legal review, Federal jurisdiction, Multiple-purpose projects.
Identifiers: Citizen suits, Corps of Engineers, Dam effects, *Environmental impact statement, Injunctive relief.

Plaintiff citizens group filed suit against the Corps of Engineers charging that the environmental impact statement (EIS) for construction of an earth-fill dam was deficient in two areas: (1) in project safety because of potential damage by earthquake; and (2) in the water purity of the project reservoir. The trial court denied a preliminary injunction but ordered the Corps of Engineers to reconsider the project in light of the nomination of archaeological

sites in the area for listing on the National Register of Historical Places. The appellate court, in observing that the Corps was reviewing the problems in question, remanded the case for consideration of the materials developed. At the hearing on the plaintiffs' motion for a permanent injunction, the United States District Court denied the motion holding that all segments of the EIS and its supplement fully complied with the National Environmental Policy Act. The court further stated that the proper forum for presentation of subsequently developed material not reasonably available to the preparers of the EIS was not the court but the executive branch officials who had the power to act. (Jones-Florida)
W78-01394

UNITED STATES V. PENNSYLVANIA ENVIRONMENTAL HEARING BOARD (GOVERNMENT CONTRACTOR-OPERATOR OF FEDERAL FACILITIES NOT IMMUNE FROM STATE REGULATION).
431 F.Supp. 747-55 (M.D. Pa. 1977).

Descriptors: *Waste water disposal, *Federal Water Pollution Control Act, *Federal jurisdiction, *Industrial wastes, Pennsylvania, Discharge(Water), State jurisdiction, Water pollution, Water pollution legislation, Sources, Effluents, Penalties(Legal), Water law, Permits, Administrative decisions, Judicial decisions.
Identifiers: *Federal Water Pollution Control Act Amendments of 1972, Liability, Sovereign immunity, State policy, Immunity(Legal aspects).

The contractor-operator of an Army ammunitions plant was fined over one-and-a-half million dollars by Pennsylvania's Department of Environmental Resources for the discharge of untreated industrial wastes into a river without a permit in violation of Pennsylvania's Clean Streams Law. The United States then filed this action requesting that the state law be declared inapplicable against the United States, and that the civil penalty be declared invalid. The government based its argument on the fact that federal installations are shielded from regulation by the states in the absence of Congressional mandate. Both the Federal Water Pollution Control Act Amendments of 1972 and the Federal Clean Air Act require suits against federal facilities to be brought in federal district court. The United States District Court found, under a restrictive application of immunity, that the contractor was not a governmental agency and therefore not immune from suit. The argument that the state could only bring its action in federal court failed. The federal statutes were held to have no bearing upon the state's action and its penalty against the munitions manufacturer was upheld. (Jones-Florida)
W78-01395

EXXON CORP. V. TRAIN (EPA DENIED AUTHORITY TO REGULATE SUBSURFACE DISPOSAL OF WASTES).
554 F. 2d 1310-31 (5th Cir. 1977).

Descriptors: Federal Water Pollution Control Act, *Waste water disposal, *Discharge(Water), *Underground waste disposal, *Natural gas, Alabama, Permits, Administrative decisions, Judicial decisions, Legislation, Oil industry, Federal jurisdiction, State jurisdiction, Water pollution, Water pollution sources, Legal aspects, Water law, Administrative agencies.
Identifiers: *Federal Water Pollution Control Act Amendments of 1972, *Environmental Protection Agency.

The plaintiff operated a natural gas production facility which disposed of its waste water through discharge into surface pits and into a formerly producing oil well. After the enactment of the 1972 Amendments to the Federal Water Pollution Control Act (FWPCAA), the plaintiff applied to the Environmental Protection Agency (EPA) for a discharge permit. A permit for surface discharge was issued, but later the EPA asserted jurisdiction over the subsurface disposal. The plaintiff sought review of the EPA's jurisdictional claim, its denial of a permit modification authorizing subsurface disposal, and its denial of an adjudicatory hearing on the permit denial. The plaintiff argued that the EPA had jurisdiction only over pollutants to navigable waters. The EPA disclaimed direct authority to regulate subsurface disposal of waste water but claimed the authority to impose conditions in the surface discharge permits that would limit or prohibit subsurface disposal where both methods were used by a single applicant. The Fifth Circuit Court of Appeals examined the FWPCAA and its legislative history concluding that the act left control over subsurface pollution to the states until further studies, determined possible methods for handling the problem. (Jones-Florida)
W78-01396

HITCHINGS V. DEL RIO WOODS RECREATION AND PARK DISTRICT (NAVIGABILITY IN FACT DIFFERENT FROM NAVIGABILITY IN LAW).
127 Cal. Rptr. 830-38 (Cal. App. 1976).

Descriptors: *California, *Navigable waters, *Non-navigable waters, *Seasonal, Navigable rivers, Legal aspects, Judicial decisions, Rivers, Recreation, Regulation, Boating, Recreation facilities, Parks, River regulation, Public access, Water law, Streams, Riparian rights, Streamflow.
Identifiers: *Declaratory judgments, *Navigability tests, Water rights(Non-riparian).

Plaintiffs brought action against defendant recreation and park district to establish the right to free and unobstructed navigation of a portion of the Russian River. The lower court declared the river section involved to be nonnavigable. This finding was based on theories of navigability, implied dedication, prescription, and custom. Plaintiffs appealed and the appellate court reversed basing its decision solely on the theory of navigability. Although substantial evidence existed to support the lower court's finding that the river was not navigable in fact in all seasons in its natural condition, the First District Court of Appeal reversed holding that navigability in fact can be distinguished from navigability in law. Relying on cases from other jurisdictions, the court found that navigability in law is not dependent on navigability in fact at all times or all seasons, nor on continuity of use or capacity for use. The Russian River in its natural condition was found to be navigable in fact for approximately nine months every year. The court stated that this was a sufficient period to make the river useful under California's recreational boating test of navigability. (Petruff-Florida)
W78-01397

KOSMATKA V. DEPARTMENT OF NATURAL RESOURCES (PERMIT FOR STRUCTURES IN NAVIGABLE LAKES).
253 N.W. 2d 887-92 (Wis. 1977).

Descriptors: *Wisconsin, *Riparian land, *Permits, *Piers, Water rights, Navigable waters, Recreational facilities, Administrative agencies, Runoff, Administrative decisions, Docks, Lakeshores, Lakes, Flood flow, Penalties(Legal), Regulation, Water law, Riparian rights, Judicial decisions, Structures, Legal review.
Identifiers: Administrative regulations, Declaratory judgments, Property interests, Navigability, Notice, Public hearing, Nuisance(Legal aspects), Property, Navigation obstructions.

The plaintiff riparian landowner constructed a pier in a navigable lake and then sought a permit for the structure from the state agency. Following a public hearing on the structure's compliance with the statutory requirements, the state agency refused to issue a permit, found the pier to be in violation, and subsequently brought criminal action against the landowner when he did not either appeal the decision through proper channels or remove the pier. The plaintiff collaterally sought a declaratory judgment contending that the pier was exempt from the permit requirements since it complied with the statutory exemption. The trial court found for the plaintiff. The Wisconsin Supreme Court reversed holding that the plaintiff's failure to appeal through proper channels, and other procedural faults, precluded the declaratory judgment. The court said that the plaintiff's structural changes would allow him to petition the agency for a new hearing. The court also suggested the state agency be more specific in identifying the nature of a structure's non-compliance so that an owner might correct the problem. (Yawn-Florida)
W78-01398

SURVEYS, INVESTIGATIONS AND ADJUDICATION OF WATER RIGHTS.
N.M. Stat ann secs 75-4-1 thru -11 (1968).

Descriptors: *Public utilities, *New Mexico, Hydrographs, *Surveys, *Adjudication procedures, Water rights, Municipal water, Interstate rivers, Interstate, Hydrography, Hydrograph analysis, Condemnation, Eminent domain, Water supply, Water supply development, Water resources, Water users, Water utilization, State governments, Public benefits, Public rights, Public utility districts.
Identifiers: *Water bonds.

New Mexico has enacted legislation imposing the duty of establishing and constructing drainage systems on the state engineer who must co-operate with county commissioners and state surveyors. The county commissioners have the authority to condemn property for the development of a public water system. In addition, commissioners must issue water revenue bonds to pay the cost of acquiring property for the construction of a water supply system. No voter approval or consent from any governmental body is required prior to the issuance of water bonds. Hydrographic surveys shall be conducted by the state engineer in cooperation with agencies of the United States to determine water rights and approximations of water supplies. In addition, the state engineer shall administer the diversion and storage of waters from interstate streams in the public interest in cases where rights of owners in the state have been subject to litigation in courts of an adjoining state. (Josepher-Florida)
W78-01399

DITCHES OR ACEQUIAS.
N.M. Stat Ann sec 75-14-1 thru -61 (1968).

Descriptors: *Acequias, *New Mexico, *Ditches, *Local governments, *Irrigation ditches, Irrigation districts, Water management(Applied), Water policy, Water supply, Water zoning, Regulation, State governments, Jurisdiction, Irrigation water, Irrigation practice, Irrigated land, Water rights, Community development, Political aspects, Irrigation programs, Water law.

Ditches known as community ditches, which are not private, not incorporated under the laws of any state or territory, and which are held and owned by more than two owners as joint tenants, or tenants in common, are the subject of these New Mexican regulations. Community ditch associations and acequias, political subdivisions of the state, are controlled by three commissioners and a mayordomo, whose duties are statutorily defined. Persons failing to perform duties or pay fees relating to the welfare of the community ditch may be fined or deprived of use of such ditch water. Mayordomos are vested with power to regulate water from joint drainage outlets, change the location of ditches and acquire land through which ditches are to be opended, and prosecute persons illegally using ditch water. All inhabitants of New Mexico have the right to construct private or com-

mon acequias and to take water from any acequia which they desire, conditioned on just compensation to the person through whose land the acequia passes. (Josepher-Florida)
W78-01400

NATURAL RESOURCE CONSERVATION DISTRICT ACT.
N.M. Stat Ann Secs 45-5-42 thru 64 (1966), as amended, (Supp 1976).

Descriptors: *Water districts, *New Mexico, *Soil conservation, *Water conservation, Water management(Applied), Water resources development, Water control, Water resources, Water policy, Water supply development, Erosion control, Erosion, Recreation, Impounded waters, Soil surfaces, Water, Water injury, Conservation, Resources, Resource allocation, Soil erosion, Soil management.

New Mexico has enacted legislation creating a commission to promote soil and water conservation, prevent floodwater damage, and further recreational, environmental, and industrial uses of impounded water. The commission creates and oversees the operation of six natural resource conservation regions. Each region is further subdivided into geographical districts made up of a minimum of twenty-five landowners. These districts are political subdivisions of the state and are vested with broad contractual powers, authority to levy assessments, and the power to sue and be sued in the name of the district. Furthermore, districts are empowered to conduct research, publish findings, and administer various programs in furtherance of resource conservation and development. The act provides for the election and appointment of district members and the dissolution or amendment of existing districts. (Josepher-Florida)
W78-01401

FEDERAL WATER RESOURCES MANAGEMENT: THE ADMINISTRATIVE SETTING,
Resources for the Future, Inc., Washington, DC.
H. Ingram, and J. R. McCain.
Public Administration Review, Vol 37, No 5, p 448-455 September/October 1977. 1 tab, 18 ref.

Descriptors: *Water policy, *Federal government, *Water resources development, *Administrative agencies, Environment, Administration, Federal project policy, Institutional constraints, Institutions, Multiple-purpose projects, Project purposes, Water demand, Southwest US, Governments, Governmental interrelations, Regions, Colorado River Basin, Arizona, New Mexico, Water pollution, Political aspects, Political constraints, Public benefits, Water users, US Water Resources Council.
Identifiers: Environmental Protection Agency, Army Corps of Engineers, Office of Management and Budget, Fish and Wildlife Service.

The long-standing traditional administrative structure and policy arena of water resources is described, the forces for change are examined, and the current administrative setting and opportunities for future modification of water policy assessed. The traditional policy-making process has closely associated water resources with the various benefits, (but rarely the costs) of economic development and has proceeded on a perception of water as an unlimited birthright. Water policies have traditionally considered water to be infinitely divisible, and policy demands from groups and individuals have been highly fragmented. The active participation of different levels of government, especially states, has further fragmented water policy-making. The resulting policies bind together a large number of diverse interests so that programs will achieve wide consent and legitimization. These same 'log-rolling' practices have also governed interagency relationships. This approach has, however, become subject to two major pressures toward change: (1) prevailing patterns of water use have reached heretofore unacknowledged physical limits, and (2) groups with environmental interests are insisting on participating in decisions and may be difficult to accommodate within the traditional policy approach. Agencies involved in water resources management have attempted to adapt to these new stresses within the traditional approach. While the regulatory authority of the Environmental Protection Agency signals a potential basis for altering the traditional approach, in practice the agency has not significantly altered the on-going pattern of interagency relationships. Opportunities for future modifications may rest upon the physical limits of water becoming more obvious, as well as upon budgetary limitations. (Ullery-Arizona)
W78-01499

WATER-RESOURCES DEVELOPMENT BY THE U.S. ARMY CORPS OF ENGINEERS IN ARIZONA 1977.
Army Engineer District, San Francisco, CA. South Pacific Div.
(1977), 80 p.

Descriptors: *Water resources development, *Arizona, *Federal government, *Projects, Multiple-purpose projects, Planning, Project purposes, Water resources, Water utilization, Project benefits, Federal project policy, Construction, Dam construction, Flood control, Flood plains, Investigations, Water supply, Water quality, Regulation, Legislation, Navigation, Navigable waters, Arid lands, Local governments, Civil engineering, Recreation facilities.
Identifiers: *Army Corps of Engineers.

The stated purpose of this book is to provide information on the scope and progress of current programs being undertaken by the Corp of Engineers in Arizona including the Corps' authorities for participating in water-resources development; its role in planning, constructing and operating projects; active investigations; and projects that are completed, under construction, or in the planning stage. An opening chapter concerning highlights of the agency's work in Arizona is followed by chapters devoted to each of the state's three subregions. Flood control projects, flood plain management services, emergency work, survey investigations, and multiple purpose storage projects in each region are described. A fifth chapter discusses the Corps participation in civil works projects concerning navigation, recreational development, water supplies, water quality, and flood control. Flood plain management services, investigative activities, special authorities, and regulatory functions of the agency are also treated. Two final chapters describe how the agency's projects are initiated, authorized, and constructed as well as how local interests share in Federal projects. A map of Corps of Engineers Projects in Arizona is attached at the end of the pamphlet. (Ullery-Arizona)
W78-01502

THE ROLE OF STATE LEGISLATION IN GROUND WATER MANAGEMENT,
Arizona Univ., Tucson. Coll. of Law.
For primary bibliographic entry see Field 4B.
W78-01503

6G. Ecologic Impact Of Water Development

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE DELAWARE COUNTY, OHIO BOARD OF COMMISSIONERS, OLENTANGY ENVIRONMENTAL CONTROL CENTER AND INTERCEPTOR SYSTEM.
Environmental Protection Agency, Chicago, IL.
For primary bibliographic entry see Field 5D.
W78-01230

RECOMMENDATIONS FOR MICROBIOLOGICAL STUDIES IN THE CONTINENTAL SHELF AREAS. RESULTS FROM TWO WORKSHOPS CONVENED 10-11 AUGUST 1976 AND 19-20 OCTOBER 1976 IN BOULDER, COLORADO. OUTER CONTINENTAL SHELF ENVIRONMENTAL ASSESSMENT PROGRAM.
National Oceanic and Atmospheric Administration, Boulder, CO. Marine Ecosystems Analysis Program.
For primary bibliographic entry see Field 5C.
W78-01274

FIELD STUDIES ON BENTHIC COMMUNITIES IN THE NEW ENGLAND OFFSHORE MINING ENVIRONMENTAL STUDY (NOMES),
New Hampshire Univ., Durham.
For primary bibliographic entry see Field 5C.
W78-01275

REVIEW OF EXISTING INFORMATION ON FISHES IN THE DEEP OCEAN MINING ENVIRONMENTAL STUDY (DOMES) AREA OF THE TROPICAL PACIFIC,
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
For primary bibliographic entry see Field 5C.
W78-01276

PRELIMINARY RESULTS WITH A PILOT-PLANT WASTE RECYCLING-MARINE AQUACULTURE SYSTEM,
Woods Hole Oceanographic Institution, MA.
For primary bibliographic entry see Field 5D.
W78-01277

METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO, DES PLAINES, O'HARE CONVEYANCE SYSTEM.
For primary bibliographic entry see Field 5D.
W78-01280

COASTAL RESOURCE USE - DECISIONS ON PUGET SOUND,
Washington Univ., Seattle. Sea Grant Program.
R. L. Bish, R. Warren, L. F. Weschler, J. A. Crutchfield, and P. Harrison.
University of Washington Press, Seattle, 1975, 206 p.

Descriptors: *Estuarine environment, *Political aspects, *Human population, *Land use, *Washington, Administrative agencies, Commercial fishing, Land development, Local governments, Federal government, Fish management, Governmental interrelations, Industries, Lumbering, Pulp and paper industry, Recreation, Salmon, Regulation, Sport fishing, State governments, Water pollution control, Water pollution, Shores.
Identifiers: *Coastal zone management, *Land use controls, *State policy, Deep water port facilities, Groundwater management, Property interests.

Nearly two-thirds of the population of Washington state lives within the Puget Sound region. This study begins with a description of the geography of the Sound, and a detailed examination of the population, urbanization, employment, and income structure of the area. The major users of the Sound--recreation, transportation, logging, fishing, and other industries--must often compete for limited resources. The authors illustrate these environmental conflicts by describing the controversies concerning four proposals for major facilities in relatively undeveloped areas: a refinery, an aluminum reduction plant, a summer home and pleasure boat development, and a deep water port. The evolution of the Washington Shoreline Management Act from its proposed form to its final passage is used as an example of the political process in environmental decision-making. However, the Act provides no specific planning or conern for the Sound itself as an integrated

resources system. The authors conclude that the wide variety of governmental units responsible for the Sound have done a satisfactory job in creating an institutional structure for governing Puget Sound's resources that matches the diverse and complex resource system with the uses people make of it. (Jordan-Florida)
W78-01355

DESIGNATION OF NEW RIVER SEGMENT AS A COMPONENT OF THE WILD AND SCENIC RIVERS SYSTEM.
For primary bibliographic entry see Field 6E.
W78-01365

AN ANALYSIS OF TECHNICAL AND LEGAL ISSUES RAISED BY THE DEVELOPMENT OF COAL SLURRY PIPELINES,
For primary bibliographic entry see Field 6E.
W78-01370

ENVIRONMENTAL DEFENSE FUND, INCORPORATED V. STAMM (ADEQUACY OF FINAL ENVIRONMENTAL IMPACT STATEMENT).
For primary bibliographic entry see Field 6E.
W78-01393

WARM SPRINGS DAM TASK FORCE V. GRIBBLE (ADEQUACY OF ENVIRONMENTAL IMPACT STATEMENT).
For primary bibliographic entry see Field 6E.
W78-01394

CENTRAL KITSAP COUNTY WASTEWATER FACILITIES, (FINAL ENVIRONMENTAL IMPACT STATEMENT).
For primary bibliographic entry see Field 5D.
W78-01407

METROPOLITAN SANITARY DISTRICT OF GREATER CHICAGO, DES PLAINES, O'HARE WATER RECLAMATION PLANT AND SOLIDS PIPELINE, VOLUME II. APPENDICES.
Environmental Protection Agency, Chicago, IL. Region V.
For primary bibliographic entry see Field 5D.
W78-01509

SANDUSKY RIVER BORDERS AND RESERVOIRS AS MIGRATORY BIRD REFUGES,
Heidelberg Coll., Tiffin, OH.
H. W. Hintz, and H. T. Barlett.
In: Proceedings of Sandusky River Basin Symposium, Held at Tiffin, Ohio on May 2-3, 1975. p 245-252. 10 ref.

Descriptors: *Birds, *Migratory birds, *Migration patterns, *River basins, Ohio, Rivers, Reservoirs, Watersheds(Basins), Census, Lake Erie, Ponds, Insects, Seasonal.
Identifiers: *Sandusky River Basin(Ohio), Four flyways theory.

The Sandusky River Basin in Ohio, situated at the confluence of several bird migration routes, includes wooded valleys, large reservoirs, and numerous farm ponds which provide habitat in an area of urban sprawl and intensive agriculture. The basin's cool-weather production of addisflies, stoneflies, alderflies, mayflies, and other insects provides food at critical times (spring and fall) for the small nocturnal migrant birds which move in a broad front across the eastern United States. Dedar waxwings, warblers, vireos, and flycatchers all feed upon these insects. Day migrants, according to the 'four flyways theory' are influenced by major topographic features--the Atlantic coast, Mississippi River, Rocky Mountains, and the Pacific coast and mountains. Two 'tributaries' each of the Atlantic and Mississippi flyways meet at the western end of Lake Erie. The Sandusky River guides the two Mississippi flyway tributaries. With the loss of much of the Lake Erie habitat, the Sandusky Basin is becoming an important migration stop. High concentrations of the orders Gaviidae, Anatidae, Charadriidae, and Scolopacidae have been observed. The Beaver Creek Reservoir, built in 1972, is primarily responsible for an increase in recorded species in Seneca County from 205 to 228 between 1968 and 1975. Seven of the 14 new water birds can be directly attributed to the reservoir, as well as increases in the numbers of common loons and horned grebes. (See also W78-01518) (Lynch-Wisconsin)
W78-01528

THE ECOLOGY OF RUNNING WATERS: THEORY AND PRACTICE,
Michigan State Univ., Hickory Corners. W. K. Kellogg Biological Station.
K. W. Cummins.
In: Proceedings of Sandusky River Basin Symposium, Held at Tiffin, Ohio on May 2-3, 1975. p 277-293. 5 fig, 2 tab, 8 ref.

Descriptors: *Ecology, *Rivers, *Streams, Lotic environment, Running waters, Watersheds(Basins), Classification, Watershed management, Water management(Applied), River basin development.

Lotic ecologists in the last 50 years have concentrated on smaller streams and rivers because of easier sampling and lesser human influence. But socioeconomic problems of flowing waters generally involve larger rivers, and it is important therefore to determine which elements of basic theory developed for smaller streams can be transferred to the larger rivers. Successful manipulation of running waters must involve (1) quantitative identification of key functional processes (theory); (2) derivation of procedures for continued assessment of community status (monitoring); and (3) adoption of procedures for maintaining or reestablishing functional balance (management). Modifications of existing classification systems of running water should include channel shape, watershed slope, temperature, discharge and runoff, and the light regime. Regardless of stream size, the overall watershed must always be considered. Broadly speaking, streams may be characterized as follows: Headwaters (orders 1-3): heterotrophic, light and nutrient poor, lesser temperature fluctuation, coarse sediments predominate. Medium-sized rivers (orders 4-6): often autotrophic, light and nutrient-rich, greater temperature fluctuation, finer sediments. Larger rivers (orders 7-12): usually heterotrophic, light-poor and nutrient-rich, lesser temperature fluctuation, fine sediments. Whereas 85% of all stream miles in the U.S. are in orders 1 to 3, the volume is in the higher orders; in higher stream orders the influence of upstream input becomes more important and terrestrial runoff less important. (See also W78-01518) (Lynch-Wisconsin)
W78-01530

SOME BRIEF REFLECTIONS ON THE SYMPOSIUM, THESE PROCEEDINGS AND WATER QUALITY STUDIES IN THE SANDUSKY RIVER BASIN,
Heidelberg Coll., Tiffin, OH.
For primary bibliographic entry see Field 5B.
W78-01534

DEVELOPMENT DOCUMENT FOR BEST TECHNOLOGY AVAILABLE FOR THE LOCATION, DESIGN, CONSTRUCTION AND CAPACITY OF COOLING WATER INTAKE STRUCTURES FOR MINIMIZING ADVERSE ENVIRONMENTAL IMPACT,
Environmental Protection Agency, Washington, DC. Effluent Guidelines Div.
For primary bibliographic entry see Field 5G.
W78-01647

LAND USE REPORT.
Environmental Protection Agency, Denver, CO. Region VIII.
For primary bibliographic entry see Field 5G.
W78-01653

CONCEPT DEFINITION OF THE ARMY ENVIRONMENTAL TECHNICAL INFORMATION SYSTEM,
Operations Research, Inc., Silver Spring, MD. Space and Communications System Div.
For primary bibliographic entry see Field 10D.
W78-01657

7. RESOURCES DATA

7B. Data Acquisition

ANALYSIS OF HYDROLOGICAL FEATURES OF PORTIONS OF THE LAKE ONTARIO BASIN USING SKYLAB AND AIRCRAFT DATA,
Environmental Research Inst. of Michigan, Ann Arbor.
For primary bibliographic entry see Field 7C.
W78-01186

VISCOSITY AND SURFACE TENSION EFFECTS ON WEIR FLOW,
Roorkee Univ. (India), Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W78-01286

PRECISION WITH WHICH SELECTED SOIL PHYSICAL PARAMETERS CAN BE ESTIMATED,
Texas A and M Univ., Overton. Agricultural Research and Extension Center.
For primary bibliographic entry see Field 2G.
W78-01302

SPONTANEOUS CHANGES OF TRANSPIRATION UNDER CONSTANT ENVIRONMENTAL CONDITIONS, (IN GERMAN),
Zurich Univ. (Switzerland). Inst. fuer Pflanzenbiologie.
For primary bibliographic entry see Field 2I.
W78-01412

FLOWMETER MOUNTINGS SOLVE PROBLEMS IN MUNICIPAL I AND I STUDY,
P. Daniels.
Water and Sewage Works, Vol. 124, No. 9, p 94-95, September, 1977.

Descriptors: *Sewers, *Infiltration, *Inflow, *Flow measurement, *Sewerage, On-site data collections, Storm water, Combined sewers, Flow profiles, Flowmeters, Instrumentation, Logging(Recording), Waste water treatment.
Identifiers: Infiltration and inflow analysis.

An inflow and infiltration study conducted in Philadelphia, Pennsylvania, by Southern Line Cleaning, Inc., may become the prototype for evaluations of other vintage municipal sewer systems. Flow is being measured at master control points, key manhole meter locations, and other selected sites to provide information on dry and wet weather high groundwater conditions, and on the effects of rainfall. For simplification, the Philadelphia system was divided into a series of subsystems and mini-systems with a broad range of age variance. The systems were presented on a series of 121 plats to aid in selecting the approximately 500 meter locations used in the monitoring program. Several types of flowmetrs were tested for use in Philadelphia before the NB Instruments float meter was chosen, including ultrasonics systems and dipper meters. Offset of the manholes

instead of direct positioning above the sewers caused problems in centerline mounting of the meters. A modified type of transducer arrangement in which a roof-mounted bracket was equipped with a float rod appropriate to the effective head depth was used. Waterproof materials were necessary since the meter element may be submerged in a combined system's mainstream under conditions of high inflow. (Schulz-FIRL)
W78-01419

PSYCHROMETRIC ANALYSIS OF TURGOR PRESSURE RESPONSE: A POSSIBLE TECHNIQUE FOR EVALUATING PLANT WATER STRESS RESISTANCE,
Agricultural Research Service, Logan, UT. Crops Research Lab.
For primary bibliographic entry see Field 2I.
W78-01500

PERFORMANCE INVESTIGATION OF THE MANNING MODEL S-4000 PORTABLE WASTEWATER SAMPLER AND THE MODEL F-3000 DIPPER FLOWMETER,
Environmental Monitoring and Support Lab., Cincinnati, OH.
For primary bibliographic entry see Field 5A.
W78-01516

HYDRAULIC SENSOR INSTRUMENTATION OF A SHORE FACE IN A TIDAL CURRENT CONVERGENCE ZONE--CAPE HENRY, VIRGINIA,
Old Dominion Univ., Norfolk, VA. Inst. of Oceanography.
For primary bibliographic entry see Field 2L.
W78-01536

THE USE OF UNDERWATER EQUIPMENT IN FRESHWATER RESEARCH.
Virginia Polytechnic Inst. and State Univ. Blacksburg.
Sea Grant Report No. VPI-SG-77-03, April 1977. 71 p. George M. Simmons, Jr. Editor.

Descriptors: *Equipment, *Underwater, *Research equipment, *Scuba diving, Lakes, Reservoirs, Sampling, Freshwater, Temperate.
Identifiers: Underwater breathing.

The 25th annual meeting of the North American Benthological Society was held April 6, 1977, in Roanoke, Virginia. The following papers were presented: Research Diving: An Overview, by George M. Simmons, Jr.; Scuba, The Problem Solver in Sampling River Benthos, by William F. Gale; The Use of Underwater Research Equipment in Temperate Lakes and Reservoirs, by Charles I. Dubay; and The Use of Underwater Research Equipment in Large Lakes and Cold Water, by Lee H. Somers. (NOAA)
W78-01537

IMPACT OF REMOTE SENSING UPON THE PLANNING, MANAGEMENT AND DEVELOPMENT OF WATER RESOURCES,
Ecosystems International, Inc., Gambrills, MD.
P. A. Castruccio, H. L. Loats, T. R. Fowler, and S. L. Frech.
Available from the National Technical Information Service, Springfield, VA 22161 as N75 25263, Price codes: A05 in paper copy, A01 in microfiche. Technical Report ECO 75:C-3-III. Sponsored by Goddard Space Flight Center, Greenbelt, Maryland, May 1975. 100 p, 26 fig, 15 tab, 29 ref.

Descriptors: *Remote sensing, *Hydrologic data, *Computer models, *Water resources development, Planning, Management, Data processing, Costs, Computer programs, Digital computers, Mathematical models.
Identifiers: *Computer usage, Data loads, Water resources users.

Principal water resources users were surveyed to determine the impact of remotely sensed data on hydrologic computer models. Analysis of responses has demonstrated that: (1) most water resources efforts suitable to remote sensing inputs are conducted by the 11 major Federal agencies or through Federally stimulated research; (2) most hydrologic models suitable to remote sensing data are Federally developed; and (3) Federal computer power is extensive. An analysis of current computer usage by major water resources users was made to determine the trends of usage and costs for the principal hydrologic users/models. The laws and empirical relationships governing the growth of the data processing loads were described and applied to project the future data loads. Data loads for ERTS CCT image processing were computed and projected through the 1985 era. The analysis shows significant impact due to the utilization and processing of ERTS CCT data. This impact and the mechanisms required to optimally utilize new remote sensing data were stressed. (Bell-Cornell)
W78-01541

REMOTELY SENSED AND LABORATORY SPECTRAL SIGNATURES OF AN OCEAN-DUMPED ACID WASTE,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
For primary bibliographic entry see Field 5A.
W78-01545

EXPERIENCE IN THE USE OF THE METHOD OF MICROELECTRICAL VERTICAL SOUNDINGS IN STUDYING IRRIGATED SOIL EVOLUTION, (IN RUSSIAN),
Moscow State Univ. (USSR). Dept. of General Soil Science.
For primary bibliographic entry see Field 2F.
W78-01559

ANNUAL BOOK OF ASTM STANDARDS. PART 31. WATER.
American Society for Testing and Materials, Philadelphia, PA.
For primary bibliographic entry see Field 5A.
W78-01576

PROCEEDINGS OF THE NASA EARTH RESOURCES SURVEY SYMPOSIUM, JUNE 1975, TECHNICAL SESSION PRESENTATIONS, LAND USE-MARINE RESOURCES, VOLUME I-C.
National Aeronautics and Space Administration, Houston, TX. Lyndon B. Johnson Space Center.
Available from the National Technical Information Service, Springfield, VA 22161 as N76-17552, Price codes: A00 in paper copy, A00 in microfiche. Report No. NASA TM X-58168. Symposium held June 9-12, 1975, Houston, Texas, September 1975 (3 Vol). 683 p. Smistad, O., Coordinator.

Descriptors: *Conferences, *Remote sensing, *Land use, *Surveys, Satellites(Artificial), Winds, Surface waters, Lakes, Water quality, Marshes, Coasts, Oceans, Salinity, Suspended solids, Mapping, Water temperature, Upwelling, Land classifications, Land resources, Terrain analysis.
Identifiers: *Marine resources, LANDSAT, Skylab.

The symposium combined a report on the utilization and the results of data from NASA programs involving LANDSAT, the Skylab Earth resources experiment package, and aircraft with information from other data acquisition programs. The primary emphasis was on the practical applications of Earth resources survey technology of interest to a large number of potential users. Also featured were scientific and technological exploration and research investigations with potential promising applications. Technical sessions were structured to provide governmental and private organizations with a comprehensive picture of various applications in the management and implementation of remote-sensing data use in their own programs. Volume I-C contained technical papers related to land use and marine resources. (See W78-01590 thru W78-01618) (Humphreys-ISWS)
W78-01589

AN EXAMINATION OF THE POTENTIAL APPLICATIONS OF AUTOMATIC CLASSIFICATION TECHNIQUES TO GEORGIA MANAGEMENT PROBLEMS,
Georgia Dept. of Natural Resources, Atlanta. Office of Planning and Research.
For primary bibliographic entry see Field 4A.
W78-01590

OHIO'S STATEWIDE LAND USE INVENTORY: AN OPERATIONAL APPROACH FOR APPLYING LANDSAT DATA TO STATE, REGIONAL AND LOCAL PLANNING PROGRAMS,
Ohio Dept. of Economic and Community Development, Columbus. Div. of Community Services.
For primary bibliographic entry see Field 4A.
W78-01591

THE DESIGN, IMPLEMENTATION, AND USE OF A STATEWIDE LAND USE INVENTORY: THE NEW YORK EXPERIENCE,
Cornell Univ., Ithaca, NY.
For primary bibliographic entry see Field 4A.
W78-01592

ALASKAN RESOURCES, CURRENT DEVELOPMENT, TRADITIONAL CULTURAL VALUES, AND THE ROLE OF LANDSAT DATA IN CURRENT AND FUTURE LAND USE MANAGEMENT PLANNING,
Alaska Univ., College.
For primary bibliographic entry see Field 4A.
W78-01593

CASES IN THE RELATION OF RESEARCH ON REMOTE SENSING TO THE DECISION-MAKERS IN A STATE AGENCY,
Wisconsin Univ.-Madison. Inst. for Environmental Studies.
For primary bibliographic entry see Field 4A.
W78-01594

THE DEVELOPMENT OF A LAND USE INVENTORY FOR REGIONAL PLANNING USING SATELLITE IMAGERY,
Ohio-Kentucky-Indiana Regional Council of Governments, Cincinnati, OH.
For primary bibliographic entry see Field 4A.
W78-01595

THREE EXAMPLES OF APPLIED REMOTE SENSING OF VEGETATION,
Texas A and M Univ. College Station.
For primary bibliographic entry see Field 7C.
W78-01602

PRESENT AND POTENTIAL LAND USE MAPPING IN MEXICO,
Mexican Water Plan, Mexico City. Physical Resources and Water Uses Group.
For primary bibliographic entry see Field 4A.
W78-01603

APPLICATION OF LANDSAT AND SKYLAB DATA FOR LAND USE MAPPING IN ITALY,
Central Lab. for Geophotogrammetry and Remote Sensing, Munich (West Germany).
For primary bibliographic entry see Field 4A.
W78-01604

THE SIGNIFICANCE OF THE SKYLAB ALTIMETER EXPERIMENTsRESULTS AND POTENTIAL RESULTS,
Battelle Columbus Labds., OH.
A. G. Mourad, S. Gopalapillai, and M. Kuhner.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 1887-1909, September 1975. 10 fig, 1 tab, 13 ref. NASA/JSC NAS913276, EPN 440.

Descriptors: *Oceans, *Surfaces, *Topography, *Remote sensing, *Mathematical models, Analytical techniques, Measurement, Profiles, Altitude, Height, Sea level, Analysis, Satellites(Artificial), Gravity, Geology, Navigation, Tides, Geophysics, Oceanography.
Identifiers: *Altimetry, Skylab, Geoid, Geodesy.

The Skylab Altimeter Experiment has proven the capability of the altimeter for measurement of sea surface topography. The geometric determination of the geoid/mean sea level from satellite altimetry is a new approach, having significant applications in many disciplines including geodesy and oceanography. A Generalized Least Squares Collocation Technique was developed for determination of the geoid from altimetry data. The technique solves for the altimetry geoid and determines one bias term for the combined effect of sea state, orbit, tides, geoid, and instrument error using sparse ground truth data. The influence of errors in orbit and a priori geoid values were discussed. Although the Skylab altimeter instrument accuracy is about + or - 1 m, significant results have been obtained in identification of large geoidal features, such as over the Puerto Rico trench. Comparison of the results of several passes showed that good agreement exists between the general slopes of the altimeter geoid and the ground truth, and that the altimeter appears to be capable of providing more details than are now available with best known geoids. The altimetry geoidal profiles show excellent correlations with bathymetry and gravity. Potential applications of altimetry results to geodesy, oceanography, and geophysics were discussed. (See also W78-01589) (Humphreys-ISWS)
W78-01605

A COMPARISON OF SKYLAB S-193 AND AIRCRAFT VIEWS OF SURFACE ROUGHNESS AND A LOOK TOWARD SEASAT,
National Oceanic and Atmospheric Administration, Miami, FL. Atlantic Oceanographic and Meteorological Labs.; National Oceanic and Atmospheric Administration, Miami, FL. Sea-Air Interaction Lab.
For primary bibliographic entry see Field 2L.
W78-01606

SKYLAB S-193 RADSCAT MICROWAVE MEASUREMENTS OF SEA SURFACE WINDS,
Kansas Univ./Center for Research, Inc., Lawrence. Remote Sensing Lab.
For primary bibliographic entry see Field 2L.
W78-01607

A PROCEDURE FOR ESTIMATION OF SEA-SURFACE TEMPERATURE FROM REMOTE MEASUREMENTS IN THE 10-13 MICROMETER SPECTRAL REGION,
Science Applications, Inc., La Jolla, CA.
For primary bibliographic entry see Field 2L.
W78-01608

SURFACE CIRCULATION IN THE GREAT LAKES AS OBSERVED BY LANDSAT-1 AUGUST 1972 TO DECEMBER 1973: SOUTHERN LAKE MICHIGAN,
National Environmental Satellite Service, Washington, DC.
For primary bibliographic entry see Field 2H.
W78-01609

OCEAN COLOR IMAGERY- COASTAL ZONE COLOR SCANNER,
National Aeronautics and Space Administration, Greenbelt, MD. Goddard Space Flight Center.
For primary bibliographic entry see Field 5A.
W78-01610

SKYLAB INVESTIGATION OF THE UPWELLING OFF THE NORTHWEST COAST OF AFRICA,
Delaware Univ., Newark. Coll. of Marine Studies.
For primary bibliographic entry see Field 2L.
W78-01611

THE FEASIBILITY OF UTILIZING REMOTELY SENSED DATA TO ASSESS AND MONITOR OCEANIC GAMEFISH,
K. J. Savastano, and T. D. Leming.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No. NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 2023-2062, September 1975. 21 fig, 8 tab, 26 ref.

Descriptors: *Remote sensing, *Fisheries, *Oceans, *Gulf of Mexico, Model studies, Forecasting, Distribution, Fish, Monitoring, Chlorophyll, Water temperature, Turbidity, Salinity, Oceanography, Testing, Satellites(Artificial), Aerial photography, Instrumentation, On-site investigations, Analytical techniques, Analysis, Evaluation, Measurement.
Identifiers: *Game fish, Skylab, Dolphin, Wahoo, Tuna.

An investigation was conducted to establish the feasibility of utilizing remotely sensed data acquired from aircraft and satellite platforms to provide information concerning the distribution and abundance of oceanic gamefish. The data from the test area were jointly acquired by NASA, the Navy, the Air Force, and NOAA/NMFS elements and private and professional fisherman in the northeastern Gulf of Mexico. The data collected has made it possible to identify significant environmental parameters for white marlin. Prediction models, based on catch data and surface truth information, have been developed and have demonstrated a potential for significantly reducing search by identifying areas that have a high probability of productivity. Three of the parameters utilized by the models, chlorophyll-a, sea surface temperature, and turbidity, were inferred from aircraft sensor data and have been tested. Effective use of Skylab data was inhibited by cloud cover and delayed delivery. Initial efforts toward establishing the feasibility of utilizing remotely sensed data to assess and monitor the distribution of oceanic gamefish has successfully identified fisheries significant oceanographic parameters and demonstrated the capability of remotely measuring most of the parameters. (See also W78-01589) (Humphreys-ISWS)
W78-01612

LANDSAT DIGITAL DATA PROCESSING - A NEAR REAL-TIME APPLICATION,
National Aeronautics and Space Administration, Greenbelt, MD. Goddard Space Flight Center.
J. Barker, C. Bohn, L. Stuart, and J. Hill.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No. NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 2063-2073, September 1975. 5 fig.

Descriptors: *Remote sensing, *Data processing, *Timing, *Feasibility studies, *Gulf of Mexico, Upwelling, Plankton, Sediments, Monitoring, Oceans, On-site investigations, Analytical techniques, Satellites(Artificial), Evaluation.
Identifiers: *Mississippi plume, LANDSAT.

Reported herein was an application of rapid generation of classed digital images form LANDSAT-1, and an evaluation by NASA in conjunction with the Environmental Protection Agency, Texas A and M University, and the Cousteau Society of its feasibility. The primary purpose was to show that satellite data could be processed and transmitted to the Calypso, which was used as a research vessel, in time for use in directing it to specific locations of possible plankton upwellings, sediment, or other anomalies in the coastal water areas along the Gulf of Mexico. LANDSAT data were received at Goddard Space Flight Center. Computer Compatible Tapes produce from the original wide band video tapes were analyzed, classified on an interactive computer system, and monochromatic prints facsimiled via the ATS-3 satellite to the Calypso, located approximately 25 kilometers offshore. This process was completed in 20 hours for one site and in less than three days for the other sites. Of the four LANDSAT-1 images examined, two were cloud-free. Large areas of silt and sediment were identified off the coasts of Florida and Louisiana. The rapid analysis of the LANDSAT images proved useful in determining the relative locations of different types of water while underway at sea, resulting in a more meaningful sampling program. (See also W78-01589) (Humphreys-ISWS)
W78-01613

QUANTITATIVE SUSPENDED SEDIMENT MAPPING USING AIRCRAFT REMOTELY SENSED MULTISPECTRAL DATA,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
R. W. Johnson.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No. NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 2087-2098, September 1975. 5 fig, 3 tab, 6 ref.

Descriptors: *Suspended solids, *Remote sensing, *Tidal waters, *Virginia, Mapping, Estuaries, Monitoring, Analytical techniques, Analysis, Evaluation, Water quality, Movement, Chlorophyll, Secchi disks, On-site investigations, Surveys, Dispersion, Regressional analysis.
Identifiers: James River(VA).

Suspended sediment is an important environmental parameter for monitoring water quality, water movement, and land use. Quantitative suspended sediment determinations were made from analysis of aircraft remotely sensed multispectral digital data. A statistical analysis and derived regression equation were used to determine and to plot quantitative suspended sediment concentration contours in the tidal James River, Virginia, on May 28, 1974. From the analysis, a single band, Band 8 (0.70-0.74 microns), was adequate for determining suspended sediment concentrations. A correlation coefficient of 0.89 was obtained with a mean inaccuracy of 23.5% for suspended sediment concentrations up to about 50 mg/l. Other water quality parameters - secchi disc depth and chlorophyll - also had high correlations with the remotely sensed data. Particle size distributions had only a fair correlation with the remotely sensed data. Additional remotely sensed data in conjunction with ground truth from a number of environmentally different areas will be required to further define the accuracy of and conditions under which regression equations for quantitative analysis of digital multispectral data may be applied. (See also W78-01589) (Humphreys-ISWS)
W78-01615

REMOTE SENSING OF SALINITY,
National Aeronautics and Space Administration, Bay St. Louis, MS. Earth Resources Lab.
For primary bibliographic entry see Field 2L.
W78-01616

AUTOMATIC INTERFACE MEASUREMENT AND ANALYSIS,
National Aeronautic and Space Administration, Bay St. Louis, MS. Earth Resources Lab.
K. H. Faller.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975. Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No. NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 2127-2146, September 1975. 7 fig, 2 tab, 6 ref.

Descriptors: *Remote sensing, *Coasts, *Alabama, *Mississippi, *Mississippi River, Length, Measurement, Monitoring, Interfaces, Land, Water, Land classification, Marshes, Vegetation, Mapping, Evaluation, Data processing, Deltas.
Identifiers: LANDSAT.

A technique for detecting and measuring the interface between two categories in classified scanner data was described together with two application demonstrations. Measurements were found to be accurate to 1.5% RMS error on features of known length, while comparison of measurements made using the technique on LANDSAT data to opisometer measurements on 1:24,000 scale maps showed excellent agreement. Application of the technique to two frames of LANDSAT data classified using a two channel, two class classifier resulted in a computation of 64 km annual measured using LANDSAT data. Based on the measurement of this portion, the total tidal shoreline length of Alabama is estmated to be 1313 kilometers. (See also W78-01589) (Humphreys-ISWS)
W78-01617

THE MAPPING OF MARSH VEGETATION USING AIRCRAFT MULTISPECTRAL SCANNER DATA,
National Aeronautics and Space Administration, Bay St. Louis, MS. Earth Resources Lab.
For primary bibliographic entry see Field 7C.
W78-01618

SURGE ACTIVITY ON THE BARNES ICE CAP,
Department of the Environment, Ottawa (Ontario). Water Resources Branch.
For primary bibliographic entry see Field 2C.
W78-01637

HELLEY-SMITH BED LOAD SAMPLERS,
Agricultural Research Service, Boise, ID.
For primary bibliographic entry see Field 2J.
W78-01641

A PROCEDURE USED FOR A GROUND TRUTH STUDY OF A LAND USE MAP OF NORTH ALABAMA GENERATED FROM LANDSAT DATA,
National Aeronautics and Space Administration, Huntsville, AL. George C. Marshall Space Flight Center.
For primary bibliographic entry see Field 7C.
W78-01651

A COMPARISON OF OCEANIC PRECIPITATION AS MEASURED BY GAGE AND ASSESSED FROM WEATHER REPORTS,
National Oceanic Atmospheric Administration, Seattle, WA. Pacific Marine Environmental Lab.
For primary bibliographic entry see Field 2B.
W78-01656

7C. Evaluation, Processing and Publication

ANALYSIS OF HYDROLOGICAL FEATURES OF PORTIONS OF THE LAKE ONTARIO BASIN USING SKYLAB AND AIRCRAFT DATA,
Environmental Research Inst. of Michigan, Ann Arbor.
F. C. Polcyn, D. L. Rebel, and J. E. Colwell.
Available from the National Technical Information Service, Springfield, VA 22161 as N76-18613, Price codes: A05 in paper copy, A01 in microfiche. ERIM 102300-19-F, January 1976. 111 p, 28 fig, 9 tab, 16 ref, 1 append. NASA NAS9-13275.

Descriptors: *Remote sensing, *Watersheds(Basins), *Lake Ontario, *Soil moisture, Satellites(Artificial), Aircraft, Model studies, Mathematical models, Data processing, Photography, Water quality, Currents(Water), Lakes, Wetlands, Vegetation, Soil water, Computer models, Computer programs, Hydrology.
Identifiers: *Skylab.

The usefulness of Skylab and aircraft data for mapping features of hydrological interest in portions of the Lake Ontario drainage basin was investigated. S190A and S190B photographic coverage is useful for mapping large-scale geomorphological features and for assessing water depth and water quality. The available S192 data were affected by low frequency noise due to a diode light which was inadvertently left of during data collection, but data preparation was successful in partially reducing this problem. The resulting data were processed using a red, near IR, and thermal band to produce a map and areal statistics of hydrologically significant features. A thermal model and a reflectance model for determination of soil moisture were developed and implemented on aircraft data over a site where field determinations of soil moisture had been made. The reflectance model appears to have promise for inferring surface soil moisture in partially vegetated terrain. (Sims-ISWS)
W78-01186

TIME SERIES ANALYSIS ON AMMONIA CONCENTRATION AND LOAD VALUES OF THE RIVER RHINE,
Nijmegen Univ. (Netherlands). Dept. of Analytical Chemistry.
For primary bibliographic entry see Field 5B.
W78-01219

SAMPLING AND ANALYSIS OF MINNESOTA TRIBUTARIES AND MUNICIPAL POINT SOURCES TO LAKE SUPERIOR.
Minnesota Pollution Control Agency, Roseville.
For primary bibliographic entry see Field 5B.
W78-01229

WORLD DATA CENTER A: GLACIOLOGY.
Geological Survey, Tacoma, WA. Water Resources Div.
For primary bibliographic entry see Field 10C.
W78-01272

A LEAST SQUARES METHOD FOR COMPUTING STATISTICAL TOLERANCE LIMITS,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
J. R. Wallace, and J. L. Grant.
Water Resources Research, Vol 13, No 5, p 819-823, October 1977. 2 fig, 9 ref. ARS 12-14-7001-98.

Descriptors: *Statistical methods, *Statistics, *Least squares method, Hydrologic data, Precipitation(Atmospheric), Runoff, Streamflow, Equations, Numerical analysis, Mathematics, Hydrology.
Identifiers: *Tolerance limits.

Statistical analysis often requires the fitting of a probability density function to sample data in order to estimate either the population parameters or a particular percentile point of the population. In either case, the exact determination of the population values cannot be expected because a sample generally does not completely describe the population. The theories of statistical confidence regions and tolerance limits allow inferences to be drawn regarding relationships between the estimates and the corresponding unknown population values. A least squares procedure was devised which allows the construction of confidence regions and tolerance limits for arbitrary distribution functions. The class errors were defined as the difference between the sample histogram and the expected frequency based upon the density function. Equations were presented which define the confidence region and tolerance limits. (Sims-ISWS)
W78-01307

WATER RESOURCES DATA FOR MISSISSIPPI, WATER YEAR 1976.
Geological Survey, Jackson, MS. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-267 754, Price codes: A15 in paper copy, A01 in microfiche. Water-Data Report MS-76-1, April 1977. 342 p, 5 fig.

Descriptors: *Mississippi, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Water resources data for the 1976 water year for Mississippi consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels of wells. This report contains discharge records for 79 gaging stations, stage records for 15 of these gaging stations, stage only records for 4 gaging stations, contents for 4 lakes and reservoirs; water quality for 20 gaging stations and 1 miscellaneous site, and water levels for 168 observation wells. Also included are data for 138 crest-stage partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Mississippi. (Woodard-USGS)
W78-01317

WATER RESOURCES DATA FOR MICHIGAN, WATER YEAR 1975.
Geological Survey, Okemos, MI. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 807, Price codes: A25 in paper copy, A01 in microfiche. Water-Data Report MI-75-1, August 1976. 574 p, 8 fig, 5 tab, 31 ref.

Descriptors: *Michigan, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Water resources data for the 1975 water year for Michigan consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality in wells and springs. This report contains discharge records for 207 gaging stations; stage only records for 1 gaging station; stage and contents for 5 lakes and reservoirs; water quality for 57 continuous-record stations, 169 partial-record stations, and 3 lakes; and water levels for 29 observation wells. Also included are 104 crest-stage partial-record stations and 43 low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are

published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Michigan. (Woodard-USGS)
W78-01318

WATER RESOURCES DATA FOR CONNECTICUT, WATER YEAR 1976.
Geological Survey, Hartford, CT. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-267 782, Price codes: A19 in paper copy, A01 in microfiche. Water-Data Report CT-76-1, April 1977. 449 p, 3 fig.

Descriptors: *Connecticut, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Water resources data for the 1976 water year for Connecticut consist of records of stage, discharge, and water quality of streams; contents and water quality of lakes and reservoirs; and water levels and water quality in wells. This report contains discharge records for 59 gaging stations; tidal volume for 1 gaging station; stage only records for 3 tidal-gaging stations; contents for 36 lakes and reservoirs; water quality for 80 gaging stations, 3 lakes, and 13 wells; and water levels for 24 observation wells. Also included are 59 crest-stage partial-record stations and 45 low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Connecticut. (Woodard-USGS)
W78-01319

WATER RESOURCES DATA FOR ARIZONA, WATER YEAR 1975.
Geological Survey, Tucson, AZ. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 326, Price codes: A20 in paper copy, A01 in microfiche. Water-Data Report AZ-75-1, September 1976. 440 p, 7 fig, 4 tab, 19 ref.

Descriptors: *Arizona, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Water resources data for the 1975 water year for Arizona consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels of observation wells. This report contains discharge records for 221 gaging stations, 185 crest-stage partial-record stations, and discharge measurements at 60 miscellaneous sites; stage records at 3 gaging stations; stage and contents records for 10 lakes and reservoirs; 17 supplementary records, included with gaging-station records, consisting of monthend or monthly stage, contents, and evaporation of lakes and reservoirs, diversion, and return flows; water-quality records for 58 continuous-record stations, 4 partial-record stations, and 30 miscellaneous sites; and water levels for 95 observation wells. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating Federal and State agencies in Arizona. (Woodard-USGS)
W78-01320

WATER RESOURCES DATA FOR WISCONSIN, WATER YEAR 1975.
Geological Survey, Madison, WI. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-259 825, Price codes: A25 in paper copy, A01 in microfiche. Water-Data Report WI-75-1, October 1976. 569 p, 8 fig, 4 tab, 26 ref.

Descriptors: *Wisconsin, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Water-resources data for the 1975 water year for Wisconsin include records of streamflow at gaging stations, partial-record stations, and miscellaneous sites; records of reservoir storage, records of chemical, physical, and biological characteristics of surface water, ground water, and precipitation; and records of water levels in observation wells. Records for a few gaging stations in bordering States also are included. These data represent that part of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies in Wisconsin. (Woodard-USGS)
W78-01321

WATER RESOURCES DATA FOR HAWAII AND OTHER PACIFIC AREAS, WATER YEAR 1975.
Geological Survey, Honolulu, HI. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-256 668, Price codes: A18 in paper copy, A01 in microfiche. Water-Data Report HI-75-1, March 1976. 401 p, 26 fig, 4 tab, 27 ref.

Descriptors: *Hawaii, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.
Identifiers: *Guam, *American Samoa.

Water resources data for the 1975 water year for Hawaii and other Pacific areas consist of records of stage, discharge, and water quality of streams; stage of a reservoir; and water levels and water quality in wells and springs. This report contains discharge records for 164 gaging stations; stage only record for 1 gaging station; water quality for 10 gaging stations, 56 partial-record flow stations and 113 wells; and water levels for 8 observation wells. Also included are 107 crest-stage partial-record stations and 103 low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State, Territorial, and Federal agencies in Hawaii and other Pacific areas. (Woodard-USGS)
W78-01322

WATER RESOURCES DATA FOR INDIANA, WATER YEAR 1976.
Geological Survey, Indianapolis, IN. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-267 885, Price codes: A17 in paper copy, A01 in microfiche. Water-Data Report IN-76-1, April 1977. 363 p, 3 fig, 22 ref.

Descriptors: *Indiana, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Water resources data for the 1976 water year for Indiana consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs: and water levels in wells. This report contains discharge records for 192 gaging stations, stage and contents for 12 lakes and reservoirs, water quality for 36 gaging stations, and water levels for 47 observation wells. Also included are 119 crest-stage partial-record stations and 49 low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements and analyses. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Indiana. (Woodard-USGS)
W78-01323

WATER RESOURCES DATA FOR IDAHO, WATER YEAR 1975.
Geological Survey, Boise, ID. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 998, Price codes: A99 in paper copy, A01 in microfiche. Water-Data Report ID-75-1, July 1976. 684 p, 22 fig, 6 tab, 40 ref.

Descriptors: *Idaho, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Water resources data for the 1975 water year for Idaho consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of wells and springs. This report contains discharge records for 192 gaging stations; stage only records for 2 gaging stations; stage for 6 lakes; contents for 24 lakes and reservoirs; water-quality for 100 gaging stations, 59 partial-record stations, 2 lakes, and 33 wells; and water levels for 79 observation wells. Also included are data for 58 crest-stage partial-record stations and 180 low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Idaho. (Woodard-USGS)
W78-01324

WATER RESOURCES DATA FOR WEST VIRGINIA, WATER YEAR 1975.
Geological Survey, Charleston, WV. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 742, Price codes: A13 in paper copy, A01 in microfiche. Water-Data Report WV-75-1, November 1976. 288 p, 4 tab, 3 fig, 32 ref.

Descriptors: *West Virginia, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Water resources data for the 1975 water year for West Virginia consist of records of stage, discharge, and water quality of streams and springs; stage and contents of lakes and reservoirs; and water levels in wells. This report contains discharge records for 131 gaging stations, stage only records for 1 gaging station, stage and

contents for 6 lakes and reservoirs, contents for 1 reservoir, water quality for 41 gaging stations, and water levels for 37 observation wells. Also included are 38 crest-stage partial-record stations and 9 low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in West Virginia. (Woodard-USGS)
W78-01325

WATER RESOURCES DATA FOR IOWA, WATER YEAR 1976.
Geological Survey, Iowa City, IA. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-266 992, Price codes: A15 in paper copy, A01 in microfiche. Water-Data Report IA-76-1, April 1977. 319 p, 6 fig.

Descriptors: *Iowa, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Water resources data for the 1976 water year for Iowa consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels in wells. This report contains discharge records for 112 gaging stations, stage and contents for 8 lakes and reservoirs, water quality for 41 gaging stations, and water levels for 43 observation wells. Also included are 128 crest-stage partial-record stations, 321 low-flow partial-record stations, and 249 water-quality partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements and analyses. The data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Iowa. (Woodard-USGS)
W78-01326

WATER RESOURCES DATA FOR ILLINOIS, WATER YEAR 1976.
Geological Survey, Champaign, IL. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-266 379, Price codes: A20 in paper copy, A01 in microfiche. Water-Data Report IL-76-1, March 1977. 464 p, 4 fig.

Descriptors: *Illinois, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Water resources data for the 1976 water year for Illinois consist of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; and water levels and water quality of ground water. This report contains discharge records for 167 gaging stations, stage only records for 5 gaging stations, stage and contents for 3 lakes and reservoirs, stage only for 5 lakes stations, water quality for 45 gaging stations, and water levels for 3 observation wells. Also included are data for 151 crest-stage partial-record stations and 251 flood-profile stations. Additional water data were collected at various sites, not involved in the systematic data-collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Illinois. (Woodard-USGS)
W78-01327

WATER RESOURCES DATA FOR OHIO, WATER YEAR 1976--VOLUME 1. OHIO RIVER BASIN.
Geological Survey, Columbus, OH. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-268 022, Price codes: A22 in paper copy, A01 in microfiche. Water-Data Report OH-76-1, May 1977. 611 p, 2 fig.

Descriptors: *Ohio, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites, Ohio River.
Identifiers: *Ohio River Basin(Ohio).

Water resources data for the 1976 water year for Ohio, presented in two volumes (Vol. 1, Ohio River basin; Vol. 2, St. Lawrence River basin), consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of ground water. This report in the two volumes contains discharge records for 166 gaging stations, stage and contents for 32 lakes and reservoirs, water quality for 156 gaging stations, 131 partial-record stations and 164 wells, and water levels for 46 observation wells. Also included are 67 crest-stage partial-record stations and 65 low-flow partial-record stations. Additional water data were collected at various sites, not involved in the systematic data-collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies in Ohio. (See also W78-01329) (Woodard-USGS)
W78-01328

WATER RESOURCES DATA FOR OHIO, WATER YEAR 1976--VOLUME 2. ST. LAWRENCE RIVER BASIN.
Geological Survey, Columbus, OH. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-268 023, Price codes: A10 in paper copy, A01 in microfiche. Water-Data Report OH-76-2, May 1977. 216 p, 2 fig.

Descriptors: *Ohio, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.
Identifiers: *St. Lawrence River basin(Ohio).

Water resources data for the 1976 water year for Ohio, presented in two volumes (Vol. 1, Ohio River basin; Vol. 2, St. Lawrence River basin), consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of ground water. This report in the two volumes contains discharge records for 166 gaging stations, stage and contents for 32 lakes and reservoirs, water quality for 156 gaging stations, 131 partial-record stations and 164 wells, and water levels for 46 observation wells. Also included are 67 crest-stage partial-record stations and 65 low-flow partial-record stations. Additional water data were collected at various sites, not involved in the systematic data-collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies in Ohio. (See also W78-01328) (Woodard-USGS)
W78-01329

WATER RESOURCES DATA FOR PENNSYLVANIA, WATER YEAR 1976--VOLUME 1. DELAWARE RIVER BASIN.
Geological Survey, Harrisburg, PA. Water Resources Div.
Water-Data Report PA-76-1, June 1977. 371 p, 12 fig, 4 tab.

Descriptors: *Pennsylvania, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites, Delaware River.
Identifiers: *Delaware River basin(Pa).

Water resources data for the 1976 water year for Pennsylvania consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of ground water. This report on the Delaware River basin, contains discharge records for 84 gaging stations; stage and contents for 10 lakes and reservoirs; water quality for 40 gaging stations, 54 partial-record stations, and water levels for 16 observation wells. Also included are 41 crest-stage partial-record stations and 31 low-flow partial-record stations. Additional water data were collected at various sites, not involved in the systematic data collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies in Pennsylvania. (See also W78-01331 and W78-01332) (Woodard-USGS)
W78-01330

WATER RESOURCES DATA FOR PENNSYLVANIA, WATER YEAR 1976--VOLUME 2. SUSQUEHANNA AND POTOMAC RIVER BASINS.
Geological Survey, Harrisburg, PA. Water Resources Div.
Water-Data Report PA-76-2, September 1977. 395 p, 7 fig, 1 tab.

Descriptors: *Pennsylvania, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites, Potomac River.
Identifiers: *Susquehanna River basin(Pa), *Potomac River basin(Pa).

Water resources data for the 1976 water year for Pennsylvania consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of ground water. This report on the Susquehanna and Potomac River basins, contains discharge records for 92 gaging stations; stage and contents for 10 lakes and reservoirs; watr quality for 38 gaging stations, 15 partial-record stations, and water levels for 30 observation wells. Also included are 24 crest-stage partial-record stations and 46 low-flow partial-record stations. Additional water data were collected at various sites, not involved in the systematic data collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies in Pennsylvania. (See also W78-01330) (Woodard-USGS)
W78-01331

WATER RESOURCES DATA FOR PENNSYLVANIA, WATER YEAR 1976--VOLUME 3. OHIO RIVER AND ST. LAWRENCE RIVER BASINS.
Geological Survey, Harrisburg, PA. Water Resources Div.
Geological Survey Water-Data Report PA-76-3, August 1977. 262 p, 6 fig.

Descriptors: *Pennsylvania, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites, Ohio.
Identifiers: *Ohio River basin(Pa), St. Lawrence River basin(Pa).

Water resources data for the 1976 water year for Pennsylvania consist of records of stage, discharge and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of ground water. This report on the Ohio and St. Lawrence River basins, contains discharge records for 93 gaging stations; stage and contents for 22 lakes and reservoirs; water quality for 3 gaging stations and water levels for 20 observation wells. Also included are 12 crest-stage partial-record stations and 27 low-flow partial-record stations. Additional water data were collected at various sites, not involved in the systematic data collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies in Pennsylvania. (See also W78-01330) (Woodard-USGS)
W78-01332

WATER RESOURCES DATA FOR TEXAS, WATER YEAR 1976--VOLUME 1. ARKANSAS RIVER BASIN, RED RIVER BASIN, SABINE RIVER BASIN, NECHES RIVER BASIN, TRINITY RIVER BASIN AND INTERVENING COASTAL BASINS.
Geological Survey, Austin, TX. Water Resources Div.
Water-Data Report TX-76-1, July 1977. 565 p, 1 tab.

Descriptors: *Texas, *Hydrologic data, *Surface waters, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Data collections, Sites.
Identifiers: *Arkansas River basin, *Red River basin, *Neches River basin, *Sabine River basin, *Trinity River basin.

Surface-water data for the 1976 water year for Texas are presented in three volumes, appropriately identified as to content by river basins. This volume (Volume 1) includes the Arkansas River, Red River, Sabine River, Neches River, Trinity River, and intervening Coastal basins. Data consist of records of stage, discharge, and water quality of streams and canals; and stage, contents, and water quality of lakes and reservoirs. Also included are crest-stage and flood-hydrograph partial-record stations, reconnaissance partial-record stations, and low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements. Records for a few pertinent stations in bordering States are also included. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Texas. (See also W78-01334 and W78-01335) (Woodard-USGS)
W78-01333

WATER RESOURCES DATA FOR TEXAS, WATER YEAR 1976--VOLUME 2. SAN JACINTO RIVER BASIN, BRAZOS RIVER BASIN, SAN BERNARD RIVER BASIN AND INTERVENING COASTAL BASINS.
Geological Survey, Austin, TX. Water Resources Div.
Water-Data Report TX-76-2, July 1977. 411 p, 1 tab.

Descriptors: *Texas, *Hydrologic data, *Surface waters, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Data collections, Sites.
Identifiers: *San Jacinto River basin, *Brazos River basin, *San Bernard River basin.

Surface-water data for 1976 water year for Texas are presented in three volumes, appropriately identified as to content by river basins. This volume (Volume 2) includes the San Jacinto River, Brazos River, San Bernard River and intervening Coastal basins. Data consist of records of stage, discharge, and water quality of streams and canals; and stage, contents, and water quality of lakes and reservoirs. Also included are crest-stage and flood-hydrograph partial-record stations, reconnaissance partial-record stations, and low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements. Records for a few pertinent stations in bordering States are also included. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Texas. (See also W78-01333) (Woodard-USGS)
W78-01334

WATER RESOURCES DATA FOR TEXAS, WATER YEAR 1976--VOLUME 3. COLORADO RIVER BASIN, LAVACA RIVER BASIN, GUADALUPE RIVER BASIN, NUECES RIVER BASIN, RIO GRANDE BASIN AND INTERVENING COASTAL BASINS.
Geological Survey, Austin, TX. Water Resources Div.
Water-Data Report TX-76-3, July 1977. 557 p, 1 tab.

Descriptors: *Texas, *Hydrologic data, *Surface waters, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Data collections, Sites.
Identifiers: *Colorado River basin, *Lavaca River basin, *Guadalupe River basin, *Nueces River basin, *Rio Grande basin.

Surface-water data for the 1976 water year for Texas are presented in three volumes, appropriately identified as to content by river basins. This volume (Volume 3) includes the Colorado River, Lavaca River, Guadalupe River, Nueces River, Rio Grande, and intervening Coastal basins. Data consist of records of stage, discharge, and water quality of streams and canals; and stage, contents, and water quality of lakes and reservoirs. Also included are crest-stage and flood-hydrograph partial-record stations, reconnaissance partial-record stations, and low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements. Records for a few pertinent stations in bordering States are also included. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Texas. (See also W78-01333) (Woodard-USGS)
W78-01335

WATER RESOURCES DATA FOR ALASKA, WATER YEAR 1975.
Geological Survey, Anchorage, AL. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-264 228, Price codes: A18 in paper copy, A01 in microfiche. Water-Data Report AK-75-1, December 1976. 410 p, 1 fig, 4 tab, 32 ref.

Descriptors: *Alaska, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Water resources data for the 1975 water year for Alaska consist of records of stage, discharge, and water quality of streams; stage and water quality of lakes; and water levels and water quality in wells and springs. This report contains discharge records for 107 gaging stations; stage only records for 2 gaging stations; water quality for 31 stations; and water levels for 19 observation wells. Also included are 85 crest-stage partial-record stations. Additional water data were collected at various sites, not part of the systematic data collection program, and are published as miscellaneous measurements of discharge, lake stage, or water quality. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Alaska. (Woodard-USGS)
W78-01336

WATER RESOURCES DATA FOR MAINE, WATER YEAR 1976.
Geological Survey, Augusta, ME. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-267 930, Price codes: A10 in paper copy, A01 in microfiche. Water-Data Report ME-76-1, May 1977. 216 p, 3 fig.

Descriptors: *Maine, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Water resources data for the 1976 water year for Maine consist of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; and water levels and water quality of wells. This report contains discharge records for 66 gaging stations, stage only records for 2 gaging stations, contents for 17 lakes and reservoirs, water quality for 13 gaging stations and 22 wells, and water levels for 17 observation wells. Additional water data were collected at various sites, not part of the systematic data collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies. (Woodard-USGS)
W78-01337

WATER RESOURCES DATA FOR NEW MEXICO, WATER YEAR 1975.
Geological Survey, Albuquerque, NM. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-263 548, Price codes: A99 in paper copy, A01 in microfiche. Water-Data Report MN-75-1, October 1976. 603 p, 5 fig, 4 tab, 39 ref.

Descriptors: *New Mexico, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Water resources data for the 1975 water year for New Mexico consist of records of discharge and

water quality of streams; stage, contents and water quality of lakes and reservoirs; and water levels and water quality in wells and springs. This report contains discharge records for 201 gaging stations; stage and contents for 23 lakes and reservoirs; water quality for 62 gaging stations, 77 partial-record flow stations, 1 reservoir, 47 springs and 197 wells; and water levels for 93 observation wells. Also included are 162 crest-stage partial-record stations and 2 low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in New Mexico. (Woodard-USGS)
W78-01338

WATER RESOURCES DATA FOR SOUTH DAKOTA, WATER YEAR 1976.
Geological Survey, Huron, SD. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-266 453, Price codes: A19 in paper copy, A01 in microfiche. Water-Data Report SD-76-1, March 1977. 435 p, 6 fig.

Descriptors: *South Dakota, *Hydrologic data, *Surface waters, *Groundwater, *Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Water resources data for the 1976 water year for South Dakota consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels in wells. This report contains discharge records for 96 gaging stations, stage and contents for 10 lakes and reservoirs, water quality for 26 gaging stations, and water levels for 16 observation wells. Also included are 105 crest-stage partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements and analyses. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in South Dakota. (Woodard-USGS)
W78-01339

WATER RESOURCES DATA FOR NEW HAMPSHIRE AND VERMONT, WATER YEAR 1975.
Geological Survey, Boston, Mass. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 800, Price codes: A09 in paper copy, A01 in microfiche. Water-Data Report NH-VT-75-1, December 1976. 186 p, 2 fig, 3 tab, 30 ref.

Descriptors: *New Hampshire, *Vermont, *Hydrologic data, *Surface waters, *Groundwater, Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data Collections, Sites.

Water-resources data for the 1975 water year for New Hampshire and Vermont consist of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; and water levels and water quality of wells. This report contains discharge records for 91 gaging stations, stage records for 5 lakes, monthend contents for 27 lakes and reservoirs, water-quality data for 5 continuing stations and 16 partial-record stations, and water levels for 17 wells. Also included are data for 42 crest-stage partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements. A few pertinent stations in the bordering States and in the Province of Quebec also are included in this report. The data represent that portion of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in New Hampshire and Vermont. (Woodard-USGS)
W78-01340

WATER RESOURCES DATA FOR MASSACHUSETTS AND RHODE ISLAND, WATER YEAR 1975.
Geological Survey, Boston, Mass. Water Resources Div.
Available from the National Technical Information Service, Springfield, VA 22161 as PB-262 801, Price codes: A13 in paper copy, A01 in microfiche. Water-Data Report MA-RI-75-1, December 1976. 288 p, 4 fig, 3 tab, 30 ref.

Descriptors: *Massachusetts, *Rhode Island, *Hydrologic data, *Surface waters, *Groundwater, Water quality, Gaging stations, Streamflow, Flow rates, Sediment transport, Water analysis, Water temperature, Chemical analysis, Lakes, Reservoirs, Water wells, Water levels, Data collections, Sites.

Water-resources data for the 1975 water year for Massachusetts and Rhode Island consist of records of stage, discharge, and water quality of streams; contents of lakes and reservoirs; and water levels and water quality of wells. This report contains discharge records for 111 gaging stations, monthend contents for 15 lakes and reservoirs, water quality for 24 gaging stations and 14 wells, and water levesl for 44 observation wells. Also included are data for 10 low-flow partial-record stations and 22 crest-stage partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements. A few pertinent stations in the bordering States are included. The data represent that portion of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Massachusetts and Rhode Island. (Woodard-USGS)
W78-01341

SYSTEM CONTROLS TREATMENT PLANT.
For primary bibliographic entry see Field 5G.
W78-01442

ASSESSMENT OF MATHEMATICAL MODELS FOR STORM AND COMBINED SEWER MANAGEMENT, APPENDIX F: SELECTED COMPUTER INPUT AND OUTPUT,
Battelle Pacific Northwest Labs., Richland, WA. Water and Land Resource Dept.
For primary bibliographic entry see Field 5B.
W78-01514

SIMULATION OF NUTRIENT LOADINGS IN SURFACE RUNOFF WITH THE NPS MODEL,
Hydrocomp, Inc., Palo Alto, CA.
For primary bibliographic entry see Field 5B.
W78-01515

CALIBRATION OF ROUGHNESS PARAMETERS FOR MATHEMATICAL MODELS OF RIVERS WITH FLOOD-PLAINS USING DYNAMIC PROGRAMMING, (IN GERMAN),
For primary bibliographic entry see Field 8B.
W78-01540

IMPACT OF REMOTE SENSING UPON THE PLANNING, MANAGEMENT AND DEVELOPMENT OF WATER RESOURCES,
Ecosystems International, Inc., Gambrills, MD.
For primary bibliographic entry see Field 7B.
W78-01541

COMPARISON OF COMPUTER SIMULATION MODELS WITH FIELD DATA FROM NEARSHORE ENVIRONMENTS,
Williams Coll. Williamstown, MA.
For primary bibliographic entry see Field 2H.
W78-01543

PROCEEDINGS OF THE NASA EARTH RESOURCES SURVEY SYMPOSIUM, JUNE 1975, TECHNICAL SESSION PRESENTATIONS, LAND USE-MARINE RESOURCES, VOLUME I-C.
National Aeronautics and Space Administration, Houston, TX. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7B.
W78-01589

AN EXAMINATION OF THE POTENTIAL APPLICATIONS OF AUTOMATIC CLASSIFICATION TECHNIQUES TO GEORGIA MANAGEMENT PROBLEMS,
Georgia Dept. of Natural Resources, Atlanta. Office of Planning and Research.
For primary bibliographic entry see Field 4A.
W78-01590

OHIO'S STATEWIDE LAND USE INVENTORY: AN OPERATIONAL APPROACH FOR APPLYING LANDSAT DATA TO STATE, REGIONAL AND LOCAL PLANNING PROGRAMS,
Ohio Dept. of Economic and Community Development, Columbus. Div. of Community Services.
For primary bibliographic entry see Field 4A.
W78-01591

THE DESIGN, IMPLEMENTATION, AND USE OF A STATEWIDE LAND USE INVENTORY: THE NEW YORK EXPERIENCE,
Cornell Univ., Ithaca, NY.
For primary bibliographic entry see Field 4A.
W78-01592

ALASKAN RESOURCES, CURRENT DEVELOPMENT, TRADITIONAL CULTURAL VALUES, AND THE ROLE OF LANDSAT DATA IN CURRENT AND FUTURE LAND USE MANAGEMENT PLANNING,
Alaska Univ., College.
For primary bibliographic entry see Field 4A.
W78-01593

THE DEVELOPMENT OF A LAND USE INVENTORY FOR REGIONAL PLANNING USING SATELLITE IMAGERY,
Ohio-Kentucky-Indiana Regional Council of Governments, Cincinnati, OH.
For primary bibliographic entry see Field 4A.
W78-01595

LUMIS-A LAND USE MANAGEMENT INFORMATION SYSTEM FOR URBAN PLANNING,
Caltech Jet Propulsion Lab., Pasadena, CA.
For primary bibliographic entry see Field 4A.
W78-01596

SATELLITE INFORMATION ON ORLANDO, FLORIDA,
Brevard County Planning Dept., Titusville, FL.
For primary bibliographic entry see Field 4A.
W78-01597

REMOTE SENSING IMPACT ON CORRIDOR SELECTION AND PLACEMENT,
Environmental Research Inst. of Michigan, Ann Arbor.
F. J. Thomson, and A. N. Sellman.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No. NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 1729-1745, September 1975. 11 fig, 1 tab, 3 ref.

Descriptors: *Highways, *Locating, *Michigan, *Planning, Remote sensing, Environment, Model studies, Analytical techniques, Land use, Computer models, Data processing, Mapping, Sites, Social aspects, Environmental effects.
Identifiers: LANDSAT.

Computer-aided corridor selection techniques, utilizing digitized data bases of socio-economic, census, and cadastral data, were developed for highway corridor routing. The Environmental Research Institute of Michigan has generated land resource data form various remote sensing data sources, and in cooperation with Transportation (MDSHT), has successfully merged the land resource data generated from LANDSAT-1 with the ancillary data files of MDSHT corridor selection model, and has designed proto-type highway corridors using the combined data set. A case study demonstrated the application of the model in selecting a highway corridor. (See also W78-01589) (Humphreys-ISWS)
W78-01598

IMPROVED RESOURCE USE DECISIONS AND ACTIONS THROUGH REMOTE SENSING,
Michigan State Univ., East Lansing.
For primary bibliographic entry see Field 6B.
W78-01599

DEVELOPMENT OF USER APPLICATIONS FOR EARTH RESOURCES SURVEY DATA IN URBAN AND REGIONAL PLANNING IN THE PUGET SOUND AREA,
Washington Univ., Seattle.
For primary bibliographic entry see Field 4A.
W78-01600

APPLICATION OF SATELLITE REMOTE-SENSING DATA,
Alaska Univ., College. Geophysical Inst.
W. J. Stringer, J. M. Miller, A. E. Shapiro, and J. H. Anderson.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No. NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 1785-1795, September 1975. 4 fig, 9 ref. USDI/BOIR E00C14201079 NASA NGL 02-001-092.

Descriptors: *Remote sensing, *Mapping, *Alaska, *Land classification, Land use, Maps, Natural resources, Exploration, Forest, Vegetation, Analysis, Geologic investigations, Surveys, Mining.
Identifiers: LANDSAT, Thermatic maps.

The Alaskan regional Native corporations currently are engaged in the selection of land entitlements authorized in the Alaska Native Claims Settlement Act by the U.S. Congress in 1971. Vegetation maps delineating potential commercial timber and maps of suggested mineral prospecting areas of seven scattered regions were prepared by interpretation of LANDSAT images, coupled with a limited amount of ground truth. Images acquired both in winter and summer seasons were registered to township maps and used in making interpretations of the areal extent of commercial timber potentials. The amount of snow cover visible through the forest canopies was found to be a useful indicator of timber potentials. No attempt was made to estimate timber volume. The satellite images were also interpreted to identify the nature of bedrock where this was possible. Identification was also made of characteristic topographic features which are typical of flood plain deposits or of the well-developed trellis drainage patterns which can indicate the strike of structural grain of underlying Cretaceous sedimentary rocks. The presence of igneous and mixed igneous and metamorphic rocks was indicated by combinations of spectral differences and anomalous interruptions of satellite data was performed on a spot basis by inspection from low altitude aircraft. Good conformity was found between the timber maps prepared from the satellite images and the selected test areas. (See also W78-01589) (Humphreys-ISWS)
W78-01601

THREE EXAMPLES OF APPLIED REMOTE SENSING OF VEGETATION,
Texas A and M Univ. College Station.
J. W. Rouse, Jr., A. R. Benton, R. W. Toler, and R. H. Haas.
In: Proceeding of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use -Marine Resources, Volume I-C. Report No. NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 1797-1810, September 1975. 6 photos. NASA NGL 44-001-001.

Descriptors: *Vegetation, *Monitoring, *Remote sensing, *Texas, Aquatic plants, Control, City planning, Mapping, Land use, Lakes, Surveys, Aerial photography, Analytical techniques, Analysis, Land development, Turf grasses, Law enforcement, Regulation.

This paper described three very different cases in which remote sensing techniques were adapted to assist in the solution of particular problem situations involving vegetation in Texas. In each case, the final sensing technique developed for operational use by the concerned organizations employed photographic sensors which were optimized through studies of the spectral reflectance characteristics of the vegetation species and background conditions unique to the problem being considered. The three examples described were: (1) assisting aquatic plant monitoring and control; (2) improving vegetation utilization in urban planning; and (3) enforcing the quarantine of Diseased Crops. (See also W78-01589) (Humphreys-ISWS)
W78-01602

PRESENT AND POTENTIAL LAND USE MAPPING IN MEXICO,
Mexican Water Plan, Mexico City. Physical Resources and Water Uses Group.
For primary bibliographic entry see Field 4A.
W78-01603

APPLICATION OF LANDSAT AND SKYLAB DATA FOR LAND USE MAPPING IN ITALY,
Central Lab. for Geophotogrammetry and Remote Sensing, Munich (West Germany).
For primary bibliographic entry see Field 4A.
W78-01604

THE SIGNIFICANCE OF THE SKYLAB ALTIMETER EXPERIMENT-RESULTS AND POTENTIAL RESULTS,
Battelle Columbus Labds., OH.
For primary bibliographic entry see Field 2L.
W78-01605

SKYLAB S-193 RADSCAT MICROWAVE MEASUREMENTS OF SEA SURFACE WINDS,
Kansas Univ./Center for Research, Inc., Lawrence. Remote Sensing Lab.
For primary bibliographic entry see Field 2L.
W78-01607

A PROCEDURE FOR ESTIMATION OF SEA-SURFACE TEMPERATURE FROM REMOTE MEASUREMENTS IN THE 10-13 MICROMETER SPECTRAL REGION,
Science Applications, Inc., La Jolla, CA.
For primary bibliographic entry see Field 2L.
W78-01608

SURFACE CIRCULATION IN THE GREAT LAKES AS OBSERVED BY LANDSAT-1 AUGUST 1972 TO DECEMBER 1973: SOUTHERN LAKE MICHIGAN,
National Environmental Satellite Service, Washington, DC.
For primary bibliographic entry see Field 2H.
W78-01609

LANDSAT DIGITAL DATA PROCESSING - A NEAR REAL-TIME APPLICATION,
National Aeronautics and Space Administration, Greenbelt, MD. Goddard Space Flight Center.
For primary bibliographic entry see Field 7B.
W78-01613

NEARSHORE COASTAL MAPPING,
Environmental Research Inst. of Michigan, Ann Arbor.
F. C. Polcyn, and D. R. Lyzenga.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No. NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 2075-2086, September 1975. 6 fig, 1 tab, 6 ref.

Descriptors: *Remote sensing, *Bathymetry, *Coasts, *Lake Michigan, *Puerto Rico, *Mapping, Seashores, Water quality, Beds under water, Oceans, Surveys, Lakes, Analysis, Analytical techniques, Evaluation, Sounding, Shallow water, Satellites(Artificial), Data processing.
Identifiers: Skylab.

Two test sites of different water quality and bottom topography were used to test for maximum water depth penetration using the Skylab S-192 MSS for measurement of nearshore coastal bathymetry. Sites under investigation lay along the Lake Michigan coastline where littoral transport acts to erode sand bluffs and endangers developments along 1,200 miles of shore, and on the west coast of Puerto Rico where unreliable shoal location and depth information constitutes a safety hazard to navigation. The S-192 and S-190A and B provide data on underwater features because of water transparency in the blue/green portion of the spectrum. Depth to 20 meters were measured with the S-192 in the Puerto Rico test site. The S-190B photography, with its improved spatial resolution, clearly delineates the triple sand bar topography in the Lake Michigan test site. Several processing techniques were employed to test for maximum depth measurement with least error. The results are useful for helping to determine an optimum spectral bandwidth for future space sensors where a bottom reflection is detectable. (See also W78-01589) (Humphreys-ISWS)
W78-01614

QUANTITATIVE SUSPENDED SEDIMENT MAPPING USING AIRCRAFT REMOTELY SENSED MULTISPECTRAL DATA,
National Aeronautics and Space Administration, Langley Station, VA. Langley Research Center.
For primary bibliographic entry see Field 7B.
W78-01615

REMOTE SENSING OF SALINITY,
National Aeronautics and Space Administration, Bay St. Louis, MS. Earth Resources Lab.
For primary bibliographic entry see Field 2L.
W78-01616

AUTOMATIC INTERFACE MEASUREMENT AND ANALYSIS,
National Aeronautic and Space Administration, Bay St. Louis, MS. Earth Resources Lab.
For primary bibliographic entry see Field 7B.
W78-01617

THE MAPPING OF MARSH VEGETATION USING AIRCRAFT MULTISPECTRAL SCANNER DATA,
National Aeronautics and Space Administration, Bay St. Louis, MS. Earth Resources Lab.
M. K. Butera.
In: Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Session Presentations, Land Use-Marine Resources, Volume I-C. Report No. NASA TM X-58168, Symposium held June 9-12, 1975, Houston, Texas, p 2147-2166, September 1975. 27 fig, 3 tab, 8 ref.

Descriptors: *Remote sensing, *Coastal marshes, *Louisiana, *Mapping, Marshes, Coasts, Salinity, Vegetation, Monitoring, On-site investigations, Water, Interfaces, Aerial photography, Brackish water, Freshwater.

A test was conducted to determine if salinity regimes in coastal marshland could be mapped and monitored by the identification and classification of marsh vegetative species from aircraft multispectral scanner data. The data was acquired at 6.1 km (20,000 ft.) on October 2, 1974, over a test area in the coastal marshland of southern Louisiana including fresh, intermediate, brackish and saline zones. The data was classified by vegetational species using a supervised, spectral pattern recognition procedure. Accuracies of training sites ranged from 67% to 96%. Marsh zones based on free soil water salinity were determined from the species classification to demonstrate a practical use for mapping marsh vegetation. (See also W78-01589) (Humphreys-ISWS)
W78-01618

RAINFALL ANALYSIS FOR DRAINAGE DESIGN, VOLUME II, LONG-DURATION PRECIPITATION DATA,
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 2B.
W78-01649

A PROCEDURE USED FOR A GROUND TRUTH STUDY OF A LAND USE MAP OF NORTH ALABAMA GENERATED FROM LANDSAT DATA,
National Aeronautics and Space Administration, Huntsville, AL. George C. Marshall Space Flight Center.
S. W. Downs, Jr., G. C. Sharma, and C. Bagwell.
Available from the National Technical Information Service, Springfield, VA 22161 as NASA TND-8420, Price codes: A04 in paper copy, A01 in microfiche. Technical Note D-8420, February 1977. 62 p, 27 fig, 6 tab, 6 ref.

Descriptors: *Remote sensing, *Satllites(Artificial), *Land use, *Alabama, Forests, Surface waters, Wetlands, Agriculture, Cities, Ranges, Snow cover, Data processing, Classification, Land classification, Analytical techniques.
Identifiers: *LANDSAT-1.

A land use map of a 5 county area in North Alabama was generated from LANDSAT data using a supervised classification algorithm. There was good overall agreement between the land use designated and known conditions, but also there were obvious discrepancies. In ground checking the map, two types of errors were encountered, shift and misclassification; and a method was developed to eliminate or to reduce greatly the errors. Randomly selected study areas containing 2,525 pixels were analyzed. Overall, 76.3% of the pixels were classified correctly. A contingency coefficient of correlation was calculated to be 0.7, which is significant at the alpha = 0.01 level. The study showed that land use maps generated by computers from LANDSAT data are useful for overall land use by regional agencies. However, care must be used when making detailed analysis of small areas. The procedure used for conducting the ground truth study together with data from representative study areas were presented in this report. (Sims-ISWS)
W78-01651

AD HOC ADVISORY PANEL ON EVALUATED PHYSICAL PROPERTY DATA IN AID OF AQUEOUS ENVIRONMENTAL PROBLEMS.
National Academy of Sciences and National Research Council, Washington, DC. Numerical Data Advisory Board.
For primary bibliographic entry see Field 5B.
W78-01654

CONCEPT DEFINITION OF THE ARMY ENVIRONMENTAL TECHNICAL INFORMATION SYSTEM,
Operations Research, Inc., Silver Spring, MD. Space and Communications System Div.
For primary bibliographic entry see Field 10D.
W78-01657

8. ENGINEERING WORKS

8A. Structures

WATER-RESOURCES DEVELOPMENT BY THE U.S. ARMY CORPS OF ENGINEERS IN ARIZONA 1977.
Army Engineer District, San Francisco, CA. South Pacific Div.
For primary bibliographic entry see Field 6E.
W78-01502

THE RAJASTHAN CANAL PROJECT,
For primary bibliographic entry see Field 3F.
W78-01505

8B. Hydraulics

EROSION BY IMPINGING CIRCULAR TURBULENT JETS,
Alberta Univ., Edmonton. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W78-01284

ERODIBILITY OF COARSE SAND-CLAYEY SILT MIXTURES,
Lehigh Univ., Bethlehem, PA. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2J.
W78-01285

VISCOSITY AND SURFACE TENSION EFFECTS ON WEIR FLOW,
Roorkee Univ. (India), Dept. of Civil Engineering.
K. G. Ranga Raja, and G. Lal Asawa.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol. 103, No. HY10, p 1227-1231, October 1977. 2 fig, 1 tab, 9 ref, 1 append.

Descriptors: *Weirs, *Discharge measurement, *Discharge coefficient, *Flowmeters, Hydraulics, Water properties, Overflow, Equations, Laboratory tests, Measurement, Viscosity, Surface tension, Analysis, Discharge(Water).
Identifiers: Sharp crested weirs, Triangular weirs.

Weirs have been in use for a number of decades for the measurement of discharge in channels. The existing discharge relations for weirs predict the discharge reasonably well at high heads; however, the accuarcy of these relations is questionable at low heads. This is mainly due to the fact that the effects of viscosity and surface tension of the liquid are important at low heads. Proposed discharge equations for predicting discharge at low heads introduced a correction factor to account for the effects of viscosity and surface tension. The experimentally determined correction factors were presented graphically. In general, the data presented indicated an error of + or - 5% in the prediction of discharge. (Humphreys-ISWS)
W78-01286

BOUNDARY LAYER DEVELOPMENT IN OPEN WATER-CHANNEL,
Cambridge Univ. (England). Engineering Lab.
A. M. Binnie.
Journal of Hydraulic Research, Vol. 15, No. 3, p 203-210, 1977. 3 fig, 3 tab, 7 ref.

Descriptors: *Boundary layers, *Open channel flow, *Mathematical models, *Laboratory tests, Theoretical analysis, Model studies, Equations, Channel flow, Laminar flow, Numerical analysis, Approximation method, Hydraulics, Flow, Foreign research.

In accordance with experiments on a horizontal rectangular channel supplied steadily from a reservoir through a contraction, the boundary layer on the bottom was taken as laminar and two-dimensional, and the main stream above it was supposed at every cross section to possess uniform velocity. Simple alternative shapes were assumed for the boundary layer, as in well-known aeronautical theory. With the aid of the continuity and momentum equations, convergent numerical results were obtained; and it was found that, as the boundary layer thickens downstream, the free surface falls very slightly and the velocity of the main stream increases. The energy equation also was examined and provides a check on the previous work. The calculated boundary layer thickness was not inconsistent with measurements made in a channel 14 in. wide and 6 ft long. (Humphreys-ISWS)
W78-01299

LOCAL SCOUR AROUND CYLINDRICAL PIERS,
Waterloopkundig Lab., Delft (Netherlands).
H. N. C. Breusers, G. Nicollet, and H. W. Shen.
Journal of Hydraulic Research, Vol. 15, No. 3, p 211-252, 1977. 34 fig, 90 ref.

Descriptors: *Scour, *Piers, *Reviews, *Alluvial channels, Cohesionless soils, Erosion, Depth, Sediments, Documentation, Flow characteristics, Vortices, Eddies, Laboratory tests, On-site investigations, Erosion control, Model studies, Hydraulic models, Hydraulics.
Identifiers: Cylindrical piers.

A 'state of the art' report on the subject of local scour around cylindrical piers was given. After a description of the scouring process, a critical review of literature on model and field data was presented, and the empirical data were compared with theoretical considerations. The final result is a set of design suggestions together with possibilities for protection against scour. Although it was possible to present a wealth of experimental data and useful design relations have been developed, it cannot be said that all aspects of local scour near bridge piers have been cleaned up. Theoretical developments are limited, and there is not much hope for a rapid success in this complicated interaction of flow field and sediment transport. More experimental data for large diameter piers in the full range of water depths and sufficiently large flow velocity would be helpful to test the relations given. Also, prototype data are needed to improve the relations developed on the basis of

model experiments. The data would have to give relevant information of geometry, bed material, and flow field, and therefore, are difficult to obtain because maximum scour depth will occur during floods. (Humphreys-ISWS)
W78-01300

EVALUATION OF SEDIMENT CONTROL DAMS,
Pennsylvania Dept. of Transportation, Harrisburg. Bureau of Materials, Testing and Research.
For primary bibliographic entry see Field 4D.
W78-01313

ECONOMIC OPTIMIZATION OF RELIEF SEWER DESIGN,
Florida Univ., Gainesville, Dept. of Civil Engineering.
S. Graham.
Water and Pollution Control, Vol 115, No 9, p 27-28, September, 1977. 1 fig, 7 ref.

Descriptors: *Mathematical models, *Design criteria, *Sewers, *Storm water, *Combined sewers, Hydrologic aspects, Urban runoff, Storm runoff, Costs, Cost-benefit analysis, Sewerage, Pipes, Municipal wastes, Waste water treatment.

While sewer design capacities must be adequate to handle the expansion of urban areas, designs to accomodate the largest, most intense storms may be prohibitively expensive. A 'rational formula' is often used to compute the maximum discharge for an arbitrary design storm, but the method may have several drawbacks. In-system storage and surcharge can not be predicted because pipes have free surface flow. Water quality and flows in pipe networks without steady, uniform conditions can not be measured. Problems with flooding or surcharging are normally solved with pipe enlargement or twinning, although these procedures are not necessarily cost-effective. Various storm water management models, such as SSWMM and WRE, have been developed to allow analysis of surcharge and flows through a pipe system. Although the use of the models may require expensive data collection, actual running costs are low and the models can be used to find the lowest cost solution to the local storm water problem. A hypothetical example is presented to compare the cost of a larger relief system based on the rational method and a numerical model. (Schulz-FIRL)
W78-01411

SEAMLESS PIPE FOR SANITARY, STORM SEWERS.
Water and Pollution Control, Vol. 115, No. 8, p 23, August, 1977.

Descriptors: *Sewers, *Plastic pipes, *Pipes, *Conduits, *Joints(Connections), Combined sewers, Sewage treatment, Waste water treatment.

The Spiralene seamless pipe, available from UNX Ltd. of Orangeville, Ontario, can be used in gravity feed sanitary and storm sewer conduit systems. Spiralene pipe, which is produced from a high molecular weight polyethylene manufactured by Union Carbide Canada Ltd., is available in 20-ft lengths with inside diameters of up to 10 ft. Features of Spiralene pipe include a smooth inner surface, reinforced walls, and bell and spigot ends. Pipes can be joined by force fitting for storm sewers, fitted with a rubber ring gasket for sanitary sewers, or bead welded for use with corrosive liquids. (Schulz-FIRL)
W78-01415

PIPEWORK IN RIVER OR SEA ENVIRONMENTS.
Surveyor, Vol. 150, No. 4445, p 13, August, 1977.

Descriptors: *Pipes, *Sewers, *Joints(Connections), *Welded joints, *Structural members, Conveyance structures, Outfall sewers, Construction materials, Metal pipes, Pipelines, Water conveyance, Equipment, Waste water treatment.

The Stanton and Stavely Group of British Steel Corporation's Tubes Division has begun producing a series of joints for ductile iron pipeline systems. A self-anchoring joint, the Tyton Anchor, is a modified version of the Tyton gasket in which a series of stainless steel locking teeth have been molded. The Tyton Anchor utilizes standard pipes and fittings with diameters of 80-300 mm and can be self-anchored at working pressures up to 10 bars. The joint is suggested for use in water and sewage pipelines for river crossings, or in ground with poor bearing strength. Stanton and Stavely also produce a Tie-bar joint for use with larger diameters of 350-1200 mm. The Tie-bar joint is also self-anchoring and is a harness version of the standard push-in Tyton or Stantyte joint. Suitable for long sea outfalls and river crossings, the joint consists of a welded flange near the spigot which is connected to a loose flange by means of tie bolts. (Schulz-FIRL)
W78-01422

ECONOMY IN CONSTRUCTION OF SEWERAGE SYSTEM,
Bokaro Steel Ltd. (India).
A. C. Banerjee.
Journal of the Institution of Engineers (India), Vol. 57, Part EN 3, p 83-84, June, 1977. 3 fig, 1 tab.

Descriptors: *Structural engineering, *Stress relieving *Manholes, *Construction costs, *Sewage, Engineering structures, Conveyance structures, Construction materials, Waste water treatment.
Identifiers: Relief shelves.

Design modifications to reduce costs of manhole construction are described. The use of relief shelves is suggested as a means of eliminating the need for thicker walls in deep manholes. The shelves are used to reduce the magnitude of the active earth pressure thrust, the lever arm, and the moment about the base. An equation relating the degree of pressure reduction to the height of the wall and the depth of the relief from ground level is presented. Construction of a relief shelf involves the emplacement of a bracket or foot step to hold a pre-cast slab or wooden plank. The use of relief shelves for a 1,500 mm x 1,500 mm manhole 4.05 m deep resulted in a 20% saving in construction costs. Total costs are compared for standard construction methods and construction with relief shelves. (Schulz-FIRL)
W78-01423

'PIGGY-BACK' SEWER SOLVES OVERLOAD PROBLEM,
Shafer, Kline and Warren, Kansas City, Mo.
T. E. Bieszczat.
Public Works, Vol. 108, No. 10, p 87-88, October, 1977. 1 fig.

Descriptors: *Sewers, *Sewerage, *Pipelines, *Environmental engineering, *Conveyance structures, Design criteria, Separated sewers, Municipal wastes, Waste water treatment.
Identifiers: Sewerage capacity, Sewer construction techniques.

Existing sewer mains were not considered adequate to handle wet weather flow and flow anticipated for the St. Joseph's Hospital complex in Kansas City, Missouri. Several options were considered to increase the sewage capacity without extensive reconstruction. Pressurizing the existing main with bolt-down manhole rings and covers on existing and proposed manholes was not considered feasible because of the age of the existing mains and the calculated peak flow of the hospital. The construction of a supplementary line was hindered by a solid limestone ledge through which any parallel sewer would have to be installed. Replacement of the existing line with a new one in the same trench would be costly and would require interim facilities to handle the flow during construction. The installation of a 'piggy-back' supplementary line directly above the existing main was chosen and required a minimum of reconstruction. Use of the existing trench eliminated the need for rock removal and interruption of service. Armco Steel Corporation manufactured the 12 inch and 15 inch pipe used for connection of the hospital complex to the existing main. Slight modifications to the existing manholes were necessary. The application of the piggy-back solution to alleviate sewer maintenance problems in Leawood, Kansas, is described. (Schulz-FIRL)
W78-01425

GROIN LENGTH AND THE GENERATION OF EDGE WAVES,
Oregon State Univ. Corvallis. School of Oceanography.
M. K. Gaughan, and P. D. Komar.
Sea Grant College Program Reprint No. ORESU-R-77-015, Reprinted from Proceedings of the 15th Coastal Engineering Conference, held Honolulu, Hawaii, July 11-17, 1976. (ASCE), Chap 86, p 1459-1476. 7 fig, 13 ref.

Descriptors: *Groins(Structures), *Beach erosion, *Sedimentation, *Waves(Water).
Identifiers: *Edge waves, Incident waves.

A series of wave basin experiments were undertaken to better understand the selection of groin spacings and lengths. Rather than obtaining edge waves with the same period as the normal incident waves, subharmonic edge waves were produced with a period twice that of the incoming waves and a wave length equal to the groin spacing. Rips were present in the wave basin but their origin is uncertain and they were never strong enough to cause beach erosion. Subharmonic edge waves interacted with the incoming waves to give an alternating sequence of surging and collapsing breakers along the beach. Their effects on the swash were sufficient to erode the beach in some place and cause deposition in other places. Thus major rearrangements of the sand were produced between the groins, but significant erosion did not occur as had been anticipated. The ratio of this critical length to the spacing of the groins was approximately 0.15 to 0.20, and did not vary with the steepness of the normal incident waves. (NOAA)
W78-01538

CHANGES DUE TO JETTIES AT TILLAMOOK BAY, OREGON,
Oregon State Univ., Corvallis. School of Oceanography.
P. D. Komar, and T. A. Terich.
Sea Grant College Program Reprint No. ORESU-R-77-016, Reprinted from: Proceedings 15th Coastal Engineering Conference held Honolulu, Hawaii, July 11-17, 1976. (ASCE), Chap 104, p 1791-1811. 9 fig, 14 ref.

Descriptors: *Jetties, *Erosion, *Littoral drift, Oregon, Sedimentation, Beach erosion.

Bayocean Spit, separating Tillamook Bay from the Pacific Ocean on the north Oregon coast, underwent severe erosion following construction of a north jetty at the bay entrance in 1914-17. This erosion ultimately led to the complete breaching of the spit in 1952. Simultaneous to the spit erosion south of the entrance, the shoreline north of the north jetty advanced seward by some 600 m (2000 ft). This pattern of erosion and deposition following jetty construction has generally been interpreted as the jetty blocking a large north to south net littoral drift in the area. Reexamination of the shoreline changes and patterns of erosion and deposition following jetty construction dis-

agrees with this interpretation, and instead it is concluded that all of the changes resulted from local rearrangements of the beach due to the disrupted equilibrium following jetty construction, but at the same time maintaining an overall condition of zero net littoral drift. This interpretation is supported by other evidence that indicates a near-zero net drift on this portion of the Oregon Coast. Thus severe coastal erosion can result from jetty construction even in areas of zero net littoral drift. (NOAA)
W78-01539

CALIBRATION OF ROUGHNESS PARAMETERS FOR MATHEMATICAL MODELS OF RIVERS WITH FLOOD-PLAINS USING DYNAMIC PROGRAMMING, (IN GERMAN),
O. Uslu.
Available from the National Technical Information Service, Springfield, VA 22161 as N75-28079, Price codes: A09 in paper copy, A01 in microfiche. Technischen Universitat Munchen, PHD Thesis, 1974. 187 p, 29 fig, 3 tab, 58 ref.

Descriptors: *River flow, *Reach(Streams), *Roughness(Hydraulic), *Dynamic programming, *Mathematical models, Flood plains, Optimization, Hydraulics, Equations, Algorithms, Systems analysis.
Identifiers: Water surface profile, Sensitivity analysis.

Mathematical models for river flow must be calibrated with respect to their parameters. These parameters are primarily the roughness coefficients which are a measure for the energy dissipation of the flow. The state variables of one dimensional flow equations exhibit sequential interdependencies. Consequently, a dynamic programming approach to determine the optimum roughness coefficients has been used. The reach of a river under consideration is divided into subreaches of different lengths. For each of these subreaches optimum vectors of roughness coefficients for the main channel and the flood plains are determined as functions of steady discharges. The objective function of the optimization procedure is defined as the sum of the squares of the deviations between the measured and calculated water surface profiles. (Bell-Cornell)
W78-01540

ON A DIFFERENTIALLY HEATED SALT-WATER-ICE SYSTEM,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W78-01624

FORCED PLUME CHARACTERISTICS,
Mcnash Univ., Clayton (Australia). Geophysical Fluid Dynamics Lab.
P. F. Crapper.
Tellus, Vol. 29, No. 5, p 470-475, October 1977. 5 fig, 7 ref.

Descriptors: *Jets, *Turbulent flow, *Flow, Entrainment, Froude number, Hydrodynamics, Hydraulics, Dispersion, Equations, Mathematical studies, Mathematics.
Identifiers: *Force plume, Boussinesq approximation.

An investigation was made of turbulent forced plumes generated by the steady release of mass, momentum, and buoyancy from a finite source in a uniform environment. The entrainment coefficient assumption was made; however, a variable coefficient was used so that the characteristics of the transition from jet to plume behavior can be presented more clearly. A modified Broussinesq approximation was made which corrects for the effect of density variations in the mass and momentum fluxes. The treatment revealed that the characteristics of forced plumes can best be discussed by reference to the Froude number. For all cases of forced plumes (except a pure jet), the Froude number approaches a particular constant value as the height increases. (Lee-ISWS)
W78-01625

AN EXPERIMENTAL STUDY OF BLUFF BUOYANT TURBULENT SURFACE JETS,
M.M.M. Engineering Coll., Gorakhpur U.P. (India), Dept. of Civil Engineering.
P. B. B. Lal, and N. Rajaratnam.
Journal of Hydraulic Research, Vol. 15, No. 3, p 261-275, 1977. 10 fig, 1 tab, 32 ref.

Descriptors: *Turbulence, *Jets, *Turbulent flow, Velocity, Temperature, Hydrodynamics, Hydraulic, Theoretical analysis, Surfaces, Equations, Mathematical studies, Profiles.
Identifiers: *Bluff turbulent surface jets, Richardson numbers, Velocity profile, Temperature profile.

Described was an experimental study on the behavior of bluff turbulent surface jets discharged into a stagnant ambient for moderate and large source Richardson numbers. Based on fairly extensive observations, the velocity and temperature profiles in the lateral and vertical directions were found to be similar. Using the results of an earlier theoretical analysis and the present experimental results, the variation of the velocity, temperature excess, and length scales were correlated with the nondimensional longitudinal distance from the outlet (made dimensionless with the square root of the surface jet at source), and the source Richardson number. (Lee-ISWS)
W78-01633

EROSION BY CIRCULAR TURBULENT WALL JETS,
Alberta Univ., Edmonton. Dept. of Civil Engineering.
N. Rajaratnam, and B. Berry.
Journal of Hydraulic Research, Vol. 15, No. 3, p 277-289, 1977. 8 fig, 1 tab, 12 ref.

Descriptors: *Erosion, *Jets, Turbulence, River beds, Dispersion, Froude number, Scour, Hydraulics, Mathematical studies, Profiles.
Identifiers: *Turbulent wall jets, Loose beds, Circular turbulent wall jets.

Described was an experimental study on the erosion of loose beds of sand and polystyrene by circular turbulent wall jets of air and water. Characteristics of the scour hole were observed during its growth and also in the final asymptotic state. The profiles in general were found to be similar when expressed in dimensionless forms with some dispersion near the ridge which forms at the downstream end of the hole. The length scales (made dimensionless with the jet diameter) and the dimensionless characteristic time were found to be functions mainly of the densimetric Froude number. Some observations also were made on the behavior of the jet in the asymptotic erosion state. (Lee-ISWS)
W78-01634

TRANSVERSE DISPERSION IN RECTANGULAR CHANNELS,
Canada Centre for Inland Waters, Burlington (Ontario).
Y. L. Lau, and B. G. Krishnappan.
Journal of the Hydraulic Division, American Society of Civil Engineers, Vol. 103, No. HY10, Proceedings Paper 13294, p 1173-1189, October 1977. 11 fig, 2 tab, 18 ref, 1 append.

Descriptors: *Diffusion, *Channels, *Dispersion, Open channels, Open channel flow, Hydraulics, Mathematical studies, Flow, Circulation, Water pollution, Width, Mixing.
Identifiers: *Transverse dispersion coefficient, Secondary circulation, Turbulent diffusion, Dispersion relations.

Dimensional analysis showed that the commonly used dimensionless transverse dispersion coefficient, e sub z/uda*h, should depend on both the friction factor and the width-to-depth ratio of the flow. Results for e sub z lead to the conclusion that secondary circulation, and not turbulent diffusion, is the dominant transport mechanism. The results help to explain the failure to find consistent trends in the variation of e sub z/u*h and suggest that u*h is not a good representation for e sub z. Two alternative dimensionless dispersion coefficients, e sub z uW and e sub z/uda*W, were introduced. Both appear to account for secondary circulation effects more properly. The dimensionless parameter e sub z/uds*W is a function of the width-to-depth ration and appears to be affected only slightly by variations in the friction factor. The parameter e sub z/uW shows distinct dependence of both friction factor and width-to-depth ratio. Both of these are better dimensionless transverse dispersion coefficients to use than e sub z/uda*h. (Lee-ISWS)
W78-01639

MCNARY DAM, COLUMBIA RIVER, OREGON AND WASHINGTON, SECOND-STEP COFFERDAM CLOSURE, HYDRAULIC MODEL INVESTIGATION.
Army Engineer District, Portland, OR.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A000 408, Price code: A06 in paper copy, A01 in microfiche. Report No 51-1, May 1956. 73 p, 50 fig, 2 tab, 21 plate, 1 append.

Descriptors: *Oregon, *Washington, *Columbia River, *Cofferdams, *Spillways, Model studies, Hydraulic similitude, Methodology, Dams, Hydraulics, River flow, Testing.
Identifiers: *Cofferdam closure, *McNary Dam.

The closure of the second-step cofferdam at McNary Dam on the Columbia River was accomplished by depositing in a gap in the upstream leg of the cofferdam sufficient 12-ton tetrahedrons to divert the bulk of the river flow through the partially completed spillway and to allow subsequent placement of the small materials to seal the gap. The model studies that led to the successful closure of the cofferdam investigated several models and provide useful information for future studies. The procedural details were derived from the model tests for the expected range of river flows during the closure. (Singh-ISWS)
W78-01644

SURVEY OF COASTAL REVETMENT TYPES,
Coastal Engineering Research Center, Fort Belvoir, VA.
B. L. McCartney.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A026 255, Price codes: A03 in paper copy, A01 in microfiche. Miscellaneous Report 76-7, May 1976. 49 p, 5 fig, 7 tab, 36 ref, 1 append.

Descriptors: *Retaining walls, *Coastal engineering, *Shore protection, Research and development, *Design criteria, Wave pile-up, Cost analysis, Data processing, Structural design, Stability, Filters, Scour, Riprap.
Identifiers: Wave runup, Wave reflection, Armoring.

The object of the report was to provide information to coastal engineers for the planning, design and construction of a suitable coastal revetment type at a particular site. A review of 25 selected revetment types, a procedure for revetment design which includes identification of controlling site conditions, a comparative cost analysis method, and an example problem were presented. Design data included prototype installation examples, available model test results, and estimates of zero-damage wave heights, wave runup, and revetment wave reflection properties. The optimum revetment should be rough and permeable to reduce

wave runup and reflection, and it should be flexible to prevent failure during settlement. Success of any revetment will depend on accurate evaluation of wave conditions and the prediction of beach changes after construction. (Singh-ISWS)
W78-01646

RECENT PROGRESS IN POLYMER DRAG REDUCTION,
Naval Undersea Center, San Diego, CA. Dept. of Fleet Engineering.
J. W. Hoyt.
Available from the National Technical Information Service, Springfield, VA 22161 as AD-A003 941, Price codes: A04 in paper copy, A01 in microfiche. NVC TP 433, October 1974. 54 p, 20 fig, 172 ref. ONR NR 062-329.

Descriptors: *Polymers, *Turbulence, *Fluid mechanics, *Flow characteristics, Jets, Propellers, Cavitation, Drag, Heat transfer, Reviews, Suspension.
Identifiers: *Drag-reducing suspensions, Flow noise, Lift.

Recent developments on various aspects of polymer friction reduction in turbulent flow were reviewed, with special emphasis on the areas where intensive work currently is under way. Detailed attention was given to the topics of drag-reducing suspensions, heat transfer in polymer solutions, and the effect of polymers on cavitation, jets, and lift. (Adams-ISWS)
W78-01652

8C. Hydraulic Machinery

ACOP PUMPING SAMPLER. ALLUVIAL RIVER MECHANICS PROJECT,
Colorado State Univ., Fort Collins. Engineering Research Center.
For primary bibliographic entry see Field 4D.
W78-01314

SWAMPY SEWER JOB MOVES WITH BIG BACKHOES.
Highway and Heavy Construction, Vol. 120, No. 10, p 142, October, 1977.

Descriptors: *Interceptor sewers, *Construction equipment, *Earth handling equipment, *Excavation, *Sewers, Conveyance structures, Pipelines, Pipes, Sewerage, Waste water treatment.
Identifiers: Backhoes.

Two large backhoes were used by Marvec-Allstate, Inc., of Verona, New Jersey, for the emplacement of 7 miles of large diameter interceptor sewers in Ocean County, New Jersey, as part of a $5.2 million project for the Ocean County Sewer Authority. The two Koehring 1266-D backhoes, equipped with 6-cu-yd digging buckets, allowed emplacement of the sewers at a rate of 500 ft/day in spite of unfavorable hydrologic and soil conditions. In the western part of the project 20,000 ft of 20 in- and 24 in-diameter prestressed concrete gravity flow pipe was installed in open-cut, sloped trenches equipped with steel trench boxes. The eastern half of the project required the installation of three side-by-side pipelines to transport raw sewage from the island communities and to carry treated effluent to an ocean outfall. A dewatering system was necessary because of the area's high water table and special precautions were necessary because of underground cables in the area. (Schulz-FIRL)
W78-01417

LICKING OPERATIONAL PROBLEMS THE HARD WAY,
Meriden Sewer Authority, CT.
B. Nicolai.
Water and Wastes Engineering, Vol. 14, No. 9, p 51-52, 54, September, 1977.

Descriptors: *Pumping, *Pumps, Equipment, *Sewage treatment, *Sewers, Treatment facilities, Conveyance structures, Electric power failure, Power operation and maintenance, Municipal wastes, Waste water treatment.
Identifiers: Meriden(CT).

Operating problems at the Rasted Lane pumping station resulted in an inspection of several pumping stations in the Meriden, Connecticut, sewage system. Problems at the Rasted Lane station included an inoperative 50-hp 1500-gpm motor with bearing failure, a jammed gate valve, and failure of the remaining pump due to overloading of the combined thermal heater. A survey of other pumping stations revealed similar problems. Modifications were made to the system to allow simultaneous operation of the pumps and to provide a standby system in case of power failure. Goodking and O'Dea, Inc., were retained as consultants to design additions to increase pumping capacities of four of the pumping stations. As part of the sewer renovation program, 'package can' pumping systems are being phased out. (Schulz-FIRL)
W78-01418

SAFER, CLEANER HANDLING OF SEWAGE PUMPS.
Surveyor, Vol. 150, No. 4443, p 23, August, 1977.

Descriptors: *Pumps, *Equipment, *Pumping plants, *Pumping, *Operation and maintenance, Sewage treatment, Waste water treatment.
Identifiers: Submersible pump transport.

Missing Links, a series of submersible sewage pump transport units, are being produced by Treatment Contracts Limited of Andover, England. The Missing Link is capable of lifting and transporting pumps by means of a trailer-mounted framework which can extend the slide rail system above ground. The pump can be drawn up into a cage for cleaning and servicing. A service unit for ladder racks, inspection lamps, tools, and replacement pumps is also available. Two models of the pump handling systems are marketed for pumps of 2-5 hp and for pumps in the 7.5-30 hp range. (Schulz-FIRL)
W78-01433

SLUDGE EXTRACTION WITH PNEUMATIC ASSISTANCE.
Water Services, Vol 81, No 978, p 506, 509, August, 1977.

Descriptors: *Pumping, *Hydraulic equipment, *Pressure(Head), *Sludge treatment, *Dewatering, Pistons, Air entrainment, Automation, Ultrasonics, Equipment, Waste water treatment.
Identifiers: Hydrostatic valves.

The Sewpas unit was designed as a mechanical aid for sludge withdrawal from a hydrostatic valve with an operating range of approximately 1 m hydraulic differential head. The Sewpas unit was tested over a 12-month period at the Upper Stour Main Drainage Board works in England and reduced the sludge volume by 20% over the volume achieved with manual control of desludging operations. Installation requirements include the connection of an air pipe to the existing sludge pipe via a flange adaptor, and the installation of a vertical upstand pipe to contain discharge from the airlift. The Sewpas system is designed to handle sludges with solids concentrations of 8-10%. Unlike a conventional air lift system which alters the specific gravity of the sludge, the Sewpas unit utilizes a large air bubble as a piston to eject the sludge. Semi-automatic process control is provided to regulate the on-off periods of the unit. The use of ultrasonics to measure sludge solids concentrations is discussed as a future method of controlling the cut-off of the air pump. (Schulz-FIRL)
W78-01458

WAVE-POWERED PNEUMATIC SYSTEM FOR POWER GENERATION,
R. D. Bolding.
U.S. Patent No. 4,013,379, 7 p, 8 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 956, No 4, p 1324, March 22, 1977.

Descriptors: *Patents, *Waves(Water), *Ocean waves, *Coastal structures, Electric power production, Shore protection, Powerplants, Energy conversion, Equipment, Powerplants(Wave action).

A wave-powered pneumatic system for producing compressed air to be used for energy storage or power generation is comprised of an elongated seawall extending parallel to the shore and at a distance out from the shore, upon which an air-accumulating structure is built. The air-accumulating structure is divided by partitions, each consisting of stacked air chambers arranged one above the other. Each of the chambers is relatively shallow in the vertical dimension, and each chamber is closed on all sides except the end facing out to sea. A plenum chamber is connected to each of the air chambers by separate ducts having check valves which allow air to flow into the plenum chamber when pressure within the duct exceeds the pressure in the plenum chamber. The plenum chamber is connected to the air storage or power generating means. Depending upon the wave height, one or more of the chambers will be filled with a solid mass of water from each wave as the latter moves toward shore. This mass of shoreward-moving water acts as a piston, driving the air trapped in the chamber toward the rear end, and compressing it, the compressed air being forced out through the duct to the plenum chamber, and finally to the air-driven power generating means. Another advantage to the invention is that is utilizes and absorbs the kinetic energy contained in the waves, and thereby reduces the destructive potential of the waves, virtually eliminating erosion of the shores. (Sinha-OEIS)
W78-01685

WAVE POWER APPARATUS SUPPORTED AND OPERATED BY FLOATS IN WATER,
R. E. Diggs.
U.S. Patent No. 4,013,382, 12 p, 11 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 956, No 4, p 1326, March 22, 1977.

Descriptors: *Patents, *Waves(Water), *Ocean waves, Power plants, Energy transfer, Floats, Mechanical equipment, Hydraulic machinery, Powerplants(Wave action).

An apparatus for converting water wave movement into power is located on a float in a body of water. The apparatus converts the up and down movement of that float caused by waves in the water to operate a pump to displace hydraulic fluid through a hydraulic pumping station which actuates fluid motors to produce power. The force of the float movement is multiplied by a mechanical advantage so that the pump displaces the hydraulic fluid on both the upward and downward movement of the float even in calm water. A number of modules are interconnected to take advantage of as much of a wave front as desired. (Sinha-OEIS)
W78-01686

DYNAMIC POSITIONING SYSTEM FOR A VESSEL CONTAINING AN OCEAN THERMAL ENERGY CONVERSION SYSTEM,
TRW, Inc., Redondo Beach, CA. (Assignee).
R. O. Pearson.
U.S. Patent No 4,014,279, 13 p, 8 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 956, No 5, p 1632, March 29, 1977.

Descriptors: *Patents, *Energy conversion, Ships, Hydraulics, *Hydraulic systems, Effluents, Jets, Nozzles, Equipment, Ocean currents.
Identifiers: Ocea Thermal Energy Conversion(OTEC), Position holding.

A dynamic positioning system for a sea-going vessel containing an ocean thermal energy conversion (OTEC) system utilizes the thrust produced by the sea water effluents resulting from the energy conversion process to position the vessel against wind and ocean current forces. The vertical stability of the vessel containing the OTEC apparatus presents no unusual difficulty. However, the horizontal positioning of the vessel poses unique problems because of the large hull displacement and the requirement for a huge cold water pipe that extends to unusual depths. Both the warm water and cold water discharges are collected in a common annular plenum and then discharged through nozzles spaced angularly around the periphery of the plenum. Each nozzle is rotatable through a 90 degree arc in a vertical plane to alter the direction of the discharge water jet and to thereby alter the horizontal component of the thrust or the driving force acting upon the vessel. The nozzles may be selected as to location and angular orientation to attain the net resultant force vector necessary to provide station-keeping or propulsion to the vessel under most any combination of wind and ocean current conditions. (Sinha-OEIS)
W78-01693

8D. Soil Mechanics

SLAG AND QUARRY WASTE AS PIPE BEDDING MATERIAL,
Bokaro Steel Ltd. (India).
A. C. Banerjee.
Journal of the Institution of Engineers (India), Vol. 57, Part EN 3, p 89-90, June, 1977. 4 fig, 2 tab.

Descriptors: *Construction materials, *Fine aggregates, *Gravels, *Soil mechanics,*Sewers, Pipelines, Soil mechanics, Costs, Stress, Structural design, Conveyance structures, Waste water treatment.
Identifiers: Slag, Quarry wastes.

External loading and internal stresses on a buried rigid sewer pipe can be influcenced by a variety of factors, including the nature of the backfill, the unit weight of the filling material, the vertical load of the soil due to overburden, and the width of the trench. The type of bedding and the diameter of the pipe also place constraints on the depth of overburden which can safely be placed in the trench. The safe depth of the overburden for 600-mm diameter pipe would be 1.75 m for ordinary bedding and 3.25 m for first-class bedding. The use of slag and quarry wastes in a configuration with 15 mm crushed stone, 20 mm granulated blast furnace slag, and quarry dust increases the allowable overburden depth to 5 m. Use of the slag and quarry wastes instead of concrete cradle bedding results in a savings of 59 rupees/m of pipe. (Schulz-FIRL)
W78-01416

DIGGING BEFORE PILE DRIVING SPEEDS HULL SEWER JOB.
Engineering and Contract Record, Vol. 90, No. 8, p 74, August, 1977.

Descriptors: *Sewers, *Excavation, *Soil engineering, *Earth handling equipment, Concrete technology, *Piles(Foundations), Sheet piling, Construction materials, Cast-in-place structures, Pipe driving, Waste water treatment.
Identifiers: Hull(Quebec Canada), Aylmer(Quebec Canada).

Fedex and the Duquesne Piling Company are using partial pre-excavation before driving piles at the Hull area sewer project in Quebec, Canada. The sewage collection system will eventually traverse the 15 miles between Aylmer and a planned sewage treatment plant at Templeton. To eliminate the need for frames to line up piles before driving, the ditch is excavated to a depth of 19 ft below the surface and the first level of whales is emplaced. Vibratory driver/extractors are being used to drive all piles. After further excavation a second row of whales and struts is installed. The piles are being used to stabilize the 45-ft ditch in which the 8.5-ft diameter conduit is poured. The success of pre-excavation is dependent on soil type, working best in cohesive clayey soils. (Schulz-FIRL)
W78-01424

LEAKAGE OF GROUNDWATER THROUGH A SLOT IN A SHEET PILE,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
C. C. Mei.
Journal of Hydraulic Research, Vol. 15, No. 3, p 253-259, 1977. 3 fig, 2 tab, 3 ref.

Descriptors: *Leakage, *Groundwater movement, *Foundations, *Sheet piling, Mathematical models, Equations, Seepage, Wetting, Depth, Boundary processes, Head loss, Aquifers, Velocity, Groundwater.
Identifiers: Slots.

An analytical solution was obtained for the two-dimensional problem of a narrow horizontal slot in a deeply driven sheet pile which separates a water pool from a dry foundation. It was shown that the presence of even a small gap allows enough flow through it to cause considerable wetting on the protected side of the foundation. (Visocky-ISWS)
W78-01632

MCNARY DAM, COLUMBIA RIVER, OREGON AND WASHINGTON, SECOND-STEP COFFERDAM CLOSURE, HYDRAULIC MODEL INVESTIGATION.
Army Engineer District, Portland, OR.
For primary bibliographic entry see Field 8B.
W78-01644

8F. Concrete

STUDY ON SLUDGE TREATMENT--2ND REPORT,
For primary bibliographic entry see Field 5E.
W78-01512

8G. Materials

POLYMERS FOR USE IN WATER TREATMENT,
Betz Labs., Inc., Trevose, PA. (Assignee).
For primary bibliographic entry see Field 5F.
W78-01190

ELASTICIZED POLYOLEFIN POND LINING HELPS MASONITE MEET NOVA SCOTIA STANDARDS.
For primary bibliographic entry see Field 5D.
W78-01231

BLUE-CODED PIPING SOLVES WATER SERVICE PROBLEMS IN CALIF.
Water and Wastes Engineering, Vol. 14, No. 9, p 69, September, 1977.

Descriptors: *Plastic pipes, *Construction materials, *Pipe flow, *Corrosion control, Hydraulic properties, Conveyance structures, Water conveyance, California.
Identifiers: Polybutylene pipes, Alameda County(CA).

The Alameda County Water District in California has begun using corrosion-resistant polybutylene piping because of extremely corrosive soil conditions in the area. The piping is color-coded, enabling easier tracing and separation of the water lines from other underground utilities. Alameda uses polybutylene tubing for 1 inch, 1.5 inch, and 2 inch water service connections in all single and multiple dwellings, as well as commercial and industrial facilities, for the installation of new systems and the replacement of older, corroded metal lines. Polybutylene's design stress (1000 psi at 73 F) enables the tubing to deliver 30% more volume than other plastic piping of the same outside diameter, and the added strength also allows use of thinner pipe walls. Other advantages of polybutylene piping are the lower costs compared with conventional copper tubing and the speed of installation. (Schulz-FIRL)
W78-01421

SELF-CLEANING FILTER/SCREEN.
Water and Waste Treatment, Vol. 20, No. 7, p 46-47, July, 1977.

Descriptors: *Filters, *Suspended solids, *Screens, *Separation techniques, *Sewage treatment, Industrial wastes, Filtration, Equipment, Waste water treatment.

A continuous, self-cleaning filter screen, the Japanese-designed Aqua-Guard, is described. A filter element-rake combination is used to remove suspended and entrained materials from 3-300 mm in size. Collected solids are ejected to a collector to provide continuous filtering with minimal supervision and maintenance. Designed as an alternative to conventional bar or rotary screens, and Aqua-Guard contains an endless belt of interconnected filter elements which move around an upper sprocket. Aqua-Guard is suggested for use in industrial water and waste treatment, and for removal of trash from sewage influent. The filters are capable of handling up to 465,000 gal/min to remove up to 560 tons of trash/hr, and are available in a variety of screen sizes. (Schulz-FIRL)
W78-01441

RECENT PROGRESS IN POLYMER DRAG REDUCTION,
Naval Undersea Center, San Diego, CA. Dept. of Fleet Engineering.
For primary bibliographic entry see Field 8B.
W78-01652

8I. Fisheries Engineering

DEVELOPMENT DOCUMENT FOR BEST TECHNOLOGY AVAILABLE FOR THE LOCATION, DESIGN, CONSTRUCTION AND CAPACITY OF COOLING WATER INTAKE STRUCTURES FOR MINIMIZING ADVERSE ENVIRONMENTAL IMPACT,
Environmental Protection Agency, Washington, DC. Effluent Guidelines Div.
For primary bibliographic entry see Field 5G.
W78-01647

CONTROLLING GRASS CARP (CTENOPHARYNGODON IDELLA) WITH ANTIMYCIN, ROTENONE, AND THANITE AND BY ELECTROFISHING,
Fish and Wildlife Service, La Crosse, WI. Fish Control Lab.
For primary bibliographic entry see Field 5C.
W78-01666

PUGET SOUND INTERIM STUDIES, ACOUSTIC AND NET SURVEYS OF FISHES AND ZOOPLANKTON,
Washington Univ., Seattle. Dept. of Oceanography.
T. S. English, and R. E. Thorne.

Municipality of Metropolitan Seattle, Wash., Final Report, June 1977. 64 p, 35 fig, 15 tab, 6 ref.

Descriptors: *Seasonal, *Fish eggs, Fish populations, *Acoustics, *Sound waves, *Sounding, Larvae, Distribution patterns, Temporal distribution, Spatial distribution, Dye dispersion, *Outfall sewers, *Sewage effluents, *Zooplankton, *Municipal wastes, Water pollution sources, Water pollution effects, Sampling, Herrings, Washington, *Echo-sounding, *Puget Sound, Seattle(Wash).

Acoustic and net surveys of fish and zooplankton were made in central Puget Sound in the vicinity of some Metro sewer outfalls. The abundance of fishes showed substantial seasonal variation, especially juvenile herring. The patches of fishes were typically small and widely dispersed, with striking temporal instability. The abundance of fish eggs and larvae differed over the seasons, with several patterns of geographic distribution. Acoustic observations revealed restricted areas where fewer target organisms were associated with maxima of dye used to track the plume from the West Point outfall. No major or widespread effects of plumes from Metro sewer outfalls were observed using the methods of this study. (Katz)
W78-01670

9. MANPOWER, GRANTS AND FACILITIES

9C. Research Facilities

NOTES ON SEDIMENTATION ACTIVITIES, CALENDAR YEAR 1973.
Federal Highway Administration, Washington, DC.
For primary bibliographic entry see Field 2J.
W78-01185

WATER-RESOURCES DEVELOPMENT BY THE U.S. ARMY CORPS OF ENGINEERS IN ARIZONA 1977.
Army Engineer District, San Francisco, CA. South Pacific Div.
For primary bibliographic entry see Field 6E.
W78-01502

10. SCIENTIFIC AND TECHNICAL INFORMATION

10C. Secondary Publication And Distribution

PETROLEUM PROCESSING WASTES, (LITERATURE REVIEW),
Metcalf and Eddy, Inc., Des Plaines, IL.
For primary bibliographic entry see Field 5D.
W78-01238

STEEL INDUSTRY WASTES, (LITERATURE REVIEW),
Water Pollution Control Directorate, Edmonton (Alberta).
For primary bibliographic entry see Field 5D.
W78-01249

ELECTROPLATING AND CYANIDE WASTES, (LITERATURE REVIEW),
Utah State Univ., Logan.
For primary bibliographic entry see Field 5D.
W78-01262

WORLD DATA CENTER A: GLACIOLOGY.
Geological Survey, Tacoma, WA. Water Resources Div.
Glaciological Notes, No 61, January 1976. 43 p.

Descriptors: *Glaciology, *Publications, *Information retrieval, *Indexing, *Bibliographies, Documentation, Data storage and retrieval.
Identifiers: *World Data Center A(Glaciology).

'Glaciological Notes' is a quarterly publication of World Data Center-A (WDC-A), Glaciology, listing all new accessions of the Data Center such as preprints and reprints contributed by glaciologists and other interested persons. Aerial and satellite photography, maps, and numerical data will be listed also. 'Glaciological Notes' is arranged alphabetically by author. Computer-produced geographical and subject key-word indexes provide additional access keys for information retrieval. (Woodard-USGS)
W78-01272

PAPER AND ALLIED PRODUCT, (LITERATURE REVIEW),
National Council of the Paper Industry for Air and Stream Improvement Inc., New York.
For primary bibliographic entry see Field 05D.
W78-01660

10D. Specialized Information Center Services

CONCEPT DEFINITION OF THE ARMY ENVIRONMENTAL TECHNICAL INFORMATION SYSTEM,
Operations Research, Inc., Silver Spring, MD. Space and Communications System Div.
F. S. Zusman, M. K. Harmon, B. D. Sharp, and H. J. Vandersluis.
Available from the National Technical Information Service, Springfield, VA 22161 as AD/A-015014, Price codes: A09 in paper copy, A01 in microfiche. Final Report prepared for U.S. Army Medical Research and Development Command, Environmental Quality Research Directorate, Sanitary Engineering Research Branch, Washington, D.C., April 1975. 172 p, 5 fig.

Descriptors: *Operations research, *Computer programs, *Environmental control, Programs, Design, Methodology, Design criteria, Data collections, Air, Water, Land, Evaluation.
Identifiers: *Information systems, Use patterns.

This report covers the concept definition phase (Phase 2) of the Army Environmental Technical Information System (AETIS). The project was based on the concept formulated by Wladimir Gulevich in Development of the Army Environmental Technical Information System (AETIS) published as an exploratory development proposal by the U.S. Army Environmental Hygiene Agency, April 10, 1974. The study objectives were to analyze the user requirements for AETIS and to develop a detailed design and an implementation plan for the system. Over 50 individuals were interviewed in 19 government agencies and offices to determine current patterns of generation and use of environmental information. An analysis of these current methods and resources is presented and a system structure is proposed that will improve the effectiveness and efficiency of the present methods for meeting the needs of the Army for environmental information. Abstracts are given of collected materials. (Bell-Cornell)
W78-01657

10F. Preparation Of Reviews

LOCAL SCOUR AROUND CYLINDRICAL PIERS,
Waterloopkundig Lab., Delft (Netherlands).
For primary bibliographic entry see Field 08B.
W78-01300

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1969 CONVENTION RELATING TO INTERVENTION ON THE HIGH SEAS
Intervention on the High Seas: An American Approach Employing Community Standards,
W78-01368 6E

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W78-01412 2I

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W78-01551 5A

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W78-01475 5A

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W78-01238 5D

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W78-01247 5D

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W78-01248 5D

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W78-01238 5D

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Industrial Waste and Pretreatment in the Buffalo Municipal System.
W78-01270 5D

Activated Sludge Treatment of Phosphate-Containing Aqueous Effluent - With Primary Anaerobic Stage and Secondary Aerobic Stage to Prevent Formation of Thread-Like Microorganisms.
W78-01426 5D

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Studies on Nitrogen Removal in Sewage Treatment Plants (Gesuishori shisetsu ni okeru chissojokyo ni kansuru kenkyu),
W78-01446 5D

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Surveys, Investigations and Adjudication of Water Rights.
W78-01399 6E

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Proceedings of the First Federal Conference on the Great Lakes, Held at Ann Arbor, Michigan, December 13-15, 1972.
W78-01351 5G

Federal Water Resources Management: The Administrative Setting,
W78-01499 6E

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Proceedings of the First Federal Conference on the Great Lakes, Held at Ann Arbor, Michigan, December 13-15, 1972.
W78-01351 5G

Spill Prevention and Control: A Special Report,
W78-01361 5G

General Irrigation Project Regulations (Operation and Maintenance).
W78-01362 6E

Clean Water, Report to Congress-1974.
W78-01364 5G

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A Procedure Used for a Ground Truth Study of a Land Use Map of North Alabama Generated from LANDSAT Data,
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BRNO UNIV. (CZECHOSLOVAKIA). NATURWISS. FAK.
On the Food of Brown Trout (Salmo Trutta M. Fario) in the Opatovice Water Supply Reservoir (Czechoslovakia), (In German),
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BUREAU OF INDIAN AFFAIRS, WASHINGTON, DC.
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BUREAU OF OUTDOOR RECREATION, WASHINGTON, DC. OFFICE OF COMMUNICATIONS.
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COMPTROLLER GENERAL OF THE UNITED STATES, WASHINGTON, D.C.
Need to Control Discharges from Sewers Carrying Both Sewage and Storm Runoff (Rpt. to the Congress).
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Application of Sewage Sludge to Cropland: Appraisal of Potential Hazards of the Heavy Metals to Plants and Animals.
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DALHOUSIE UNIV., HALIFAX (NOVA SCOTIA). DEPT. OF CHEMISTRY.
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New Castle County Delaware River Shoreline Study,
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Pollution Studies of Trace Elements in Sediments from the Upper Saronikos Gulf, Greece,
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DEPARTMENT OF THE ENVIRONMENT, OTTAWA (ONTARIO). WATER RESOURCES BRANCH.
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Oil Pollution: Cleaning Up the Legal Mess,
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EHIME UNIV., MATSUYAMA (JAPAN). DEPT. OF APPLIED PHYSICS.
Studies on Salinization of Groundwater, 1. Theoretical Consideration on the Three-Dimensional Movement of the Salt Water Interface Caused by the Pumpage of Confined Groundwater in Fan-Shaped Alluvium,
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Analysis for Toxic Substances Present in Waste Water for Biological Purification Purposes (Pruefung von Abwasserinhaltsstoffen auf Giftwirkung fuer die biologische Klaerstuie),
W78-01480 5A

ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION, WASHINGTON, DC.
Environmental Development Plan (EDP): Hydrothermal Energy Systems FY 1977.
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ENVIRONMENTAL FILTRATION PRODUCTS, INC., ORLANDO, FL. (ASSIGNEE).
Water Treatment System,
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Performance Investigation of the Manning Model S-4000 Portable Wastewater Sampler and the Model F-3000 Dipper Flowmeter,
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ENVIRONMENTAL PROTECTION AGENCY, CHICAGO, IL.
Final Environmental Impact Statement for the Delaware County, Ohio Board of Commissioners, Olentangy Environmental Control Center and Interceptor System.
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ENVIRONMENTAL PROTECTION AGENCY, CHICAGO, IL. REGION V.
Metropolitan Sanitary District of Greater Chicago, Des Plaines, O'Hare Water Reclamation Plant and Solids Pipeline, Volume II. Appendices.
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ENVIRONMENTAL PROTECTION AGENCY, DENVER, CO. REGION VIII.
Economics of Transporting Wastewater Sludge,
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ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, DC.
Clean Water (Report to Congress, 1974).
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Clean Water, Report to Congress-1974.
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An Analysis of Construction Cost Experience for Wastewater Treatment Plants.
W78-01463 5D

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W78-01465 5D

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Control of Erosion and Sediment Deposition from Construction of Highways and Land Development,
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Catalytic Process for Ozonation of Water Containing Organic Contaminants,
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Analysis of Hydrological Features of Portions of the Lake Ontario Basin Using Skylab and Aircraft Data,
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Scale-Up of Granular Media Filters,
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Notes on Sedimentation Activities, Calendar Year 1973.
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FISH AND WILDLIFE SERVICE, LA CROSSE, WI. FISH CONTROL LAB.
Toxicity of Four Toxicants to Green Eggs of Salmonids,
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A Solenoid-Actuated Chemical-Metering Apparatus for Use in Flow-Through Toxicity Tests,
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FISHERIES AND MARINE SERVICE, ST. ANDREWS (NEW BRUNSWICK).
The Effect of Anaerobiosis on Measurement of Sulfite Pulp Mill Effluent Concentration in Estuarine Water by U.V. Spectrophotometry,
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FOREST HYDROLOGY LAB., OXFORD, MS.
Fertilization to Accelerate Loblolly Pine Foliage Growth for Erosion Control,
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Effect of Water Depth in Net Cages on the Growth and Body Shape of Tilapia Mossambica, (In Japanese),
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GEOLOGICAL SURVEY, ALBUQUERQUE, NM. WATER RESOURCES DIV.
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GEOLOGICAL SURVEY, ANCHORAGE, AL. WATER RESOURCES DIV.
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Water Resources Data for Maine, Water Year 1976.
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GEOLOGICAL SURVEY, AUSTIN, TX. WATER RESOURCES DIV.
Water Resources Data for Texas, Water Year 1976--Volume 1. Arkansas River Basin, Red River Basin, Sabine River Basin, Neches River Basin, Trinity River Basin and Intervening Coastal Basins.
W78-01333 7C

Water Resources Data for Texas, Water Year 1976--Volume 2. San Jacinto River Basin, Brazos River Basin, San Bernard River Basin and Intervening Coastal Basins.
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GEOLOGICAL SURVEY, BOISE, ID. WATER RESOURCES DIV.
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Water Resources Data for Illinois, Water Year 1976.
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GEOLOGICAL SURVEY, CHARLESTON, WV. WATER RESOURCES DIV.
Water Resources Data for West Virginia, Water Year 1975.
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GEOLOGICAL SURVEY, COLUMBUS, OH. WATER RESOURCES DIV.
Water Resources Data for Ohio, Water Year 1976--Volume 1. Ohio River Basin.
W78-01328 7C

Water Resources Data for Ohio, Water Year 1976--Volume 2. St. Lawrence River Basin.
W78-01329 7C

GEOLOGICAL SURVEY, HARRISBURG, PA. WATER RESOURCES DIV.
Water Resources Data for Pennsylvania, Water Year 1976--Volume 1. Delaware River Basin.
W78-01330 7C

Water Resources Data for Pennsylvania, Water Year 1976--Volume 2. Susquehanna and Potomac River Basins.
W78-01331 7C

Water Resources Data for Pennsylvania, Water Year 1976--Volume 3. Ohio River and St. Lawrence River Basins.
W78-01332 7C

GEOLOGICAL SURVEY, HARTFORD, CT. WATER RESOURCES DIV.
Water Resources Data for Connecticut, Water Year 1976.
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GEOLOGICAL SURVEY, HONOLULU, HI. WATER RESOURCES DIV.
Water Resources Data for Hawaii and Other Pacific Areas, Water Year 1975.
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GEOLOGICAL SURVEY, HURON, SD. WATER RESOURCES DIV.
Water Resources Data for South Dakota, Water Year 1976.
W78-01339 7C

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Water Resources Data for Iowa, Water Year 1976.
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GEOLOGICAL SURVEY, JACKSON, MS. WATER RESOURCES DIV.
Water Resources Data for Mississippi, Water Year 1976.
W78-01317 7C

GEOLOGICAL SURVEY, MADISON, WI. WATER RESOURCES DIV.
Water Resources Data for Wisconsin, Water Year 1975.
W78-01321 7C

GEOLOGICAL SURVEY, OKEMOS, MI. WATER RESOURCES DIV.
Water Resources Data for Michigan, Water Year 1975.
W78-01318 7C

GEOLOGICAL SURVEY, TACOMA, WA. WATER RESOURCES DIV.
World Data Center A: Glaciology.
W78-01272 10C

GEOLOGICAL SURVEY, TUCSON, AZ. WATER RESOURCES DIV.
Water Resources Data for Arizona, Water Year 1975.
W78-01320 7C

GEORGIA DEPT. OF NATURAL RESOURCES, ATLANTA. OFFICE OF PLANNING AND RESEARCH.
An Examination of the Potential Applications of Automatic Classification Techniques to Georgia Management Problems,
W78-01590 4A

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A Least Squares Method for Computing Statistical Tolerance Limits,
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Removal of Soluble Mercury From Water by Rubber,
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Spill Prevention and Control: A Special Report,
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Disposal of Liquid Effluent from Sewage Treatment Plants,
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HAWAII STATE DEPT. OF PLANNING AND ECONOMIC DEVELOPMENT, HONOLULU.
Coastal Zone Management in Hawaii,
W78-01367 6E

HAWAII UNIV., HONOLULU. COLL. OF BUSINESS ADMINISTRATION.
Desalting Plants Inventory Report No. 6,
W78-01491 3A

HAWAII UNIV., HONOLULU. DEPT. OF AGRICULTURAL BIOCHEMISTRY.
Total and Organic Mercury in the Pacific Blue Marlin,
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Models for Predicting the Impact of Irrigation on Soil Salinity,
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Irrigation with Saline Water Under Desert Conditions,
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A New Method of Disposal of By-Product Acid Sludge from a Lube Re-Refining Plant,
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Experiences with the Algal Assay Procedure (Erfahrungen mit der Algal Assay Procedure),
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Heavy Rainfall Relations Over Chicago and Northeastern Illinois,
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ILLINOIS UNIV. AT URBANA-CHAMPAIGN. LAB. FOR ATMOSPHERIC RESEARCH; AND ILLINOIS STATE WATER SURVEY, URBANA.
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IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND). DEPT. OF PUBLIC HEALTH ENGINEERING.
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Effective Rainfall in Irrigated Agriculture,
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INSTITUT ROYAL METEOROLOGIQUE DE BELGIQUE, BRUSSELS.
Daily Potential Interception of Rainfall by Different Forest Populations, (In French),
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INSTITUT ZA OCEANOGRAFIJU I RIBARSTVO, SPLIT (YUGOSLAVIA).
On Certain Theoretical and Practical Problems in Raising Fish of the Mugilidae Family, (In Serbo-Croatian),
W78-01588 2I

INSTITUTE FOR BIOLOGICAL RESEARCH, BELGRADE, (YUGOSLOVIA).
Seasonal Dynamism of Nitrogen Fixers and Cellulose Degrading Microorganisms in Waters and Sediments of the Danube River. (In Ferbo-Croatian),
W78-01211 5A

INSTITUTO NACIONAL DE INVESTIGACIONES AGRARIAS, MADRID (SPAIN). DEPT. DE CELULOSA E INDUSTRIAS DE EXTRACCION.
Control of Environmental Pollution by Pulp and Paper Industry. I. Water Quality Parameters (Sobre el control de la contaminacion ambiental por vertidos de las industrias de celulosa y papel. I. Parametros mas empleados de calidad de las aguas),
W78-01582 5G

INTERNATIONAL CENTER FOR ARID AND SEMI-ARID LAND STUDIES, LUBBOCK, TX.
Managing Saline Water for Irrigation.
W78-01492 3C

INTERNATIONAL REFERENCE GROUP ON GREAT LAKES POLLUTION FROM LAND USE ACTIVITIES.
Proceedings of Sandusky River Basin Symposium, Held at Tiffin, Ohio on May 2-3, 1975.
W78-01518 5B

JET PROPULSION LAB., PASADENA, CA.
Carbon-Chlorine-Carbon Sewage Treatment,
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Upgrading Existing Wastewater Treatment Plants. Pre-Plant Considerations,
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KANSAI UNIV., OSAKA (JAPAN). DEPT. OF ENGINEERING.
Characteristics of the Run-Off Rate of Pollution Load in an Unsewerage Area,
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Skylab S-193 Radscat Microwave Measurements of Sea Surface Winds,
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Method for the Recycle Treatment of Waste Water from Chromium Plating,
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KOMENSKEHO UNIV., BRATISLAVA (CZECHOSLOVAKIA). KATEDRA SYST. EKOL. ZOOL.
Influence of Vinansky Lake Upon the Formation of Crustaceoplankton in the New Zemplinska Sirava Dam, (In German),
W78-01687 2H

KYOTO UNIV. (JAPAN). DEPT. OF HYDROCARBON CHEMISTRY.
Photo-Induced Purification of Water (1)- Ultra-Violet Acceleration of Sedimentation of Metal Hydroxide Suspension in Water (Hikari ni yoru mizu no jokaho (I)- hikari niyoru gyoshu chinden no sokushin),
W78-01253 5D

KYUSHU UNIV., FUKUOKA (JAPAN). DEPT. OF FOOD SCIENCE AND TECHNOLOGY.
Effects of Several Operational Parameters on the Removal Efficiency of the Tower-Type Packed Biofilter (Juten toshikiro sho ho ni okeru sekkei, unten parameta no joka koritsu ni oyobosu eikyo),
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Radon 222 Distribution and Transport Across the Sediment-Water Interface in the Hudson River Estuary,
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Erodibility of Coarse Sand-Clayey Silt Mixtures,
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LINDE A.G., WIESBADEN (WEST GERMANY). (ASSIGNEE).
Process and Apparatus for the Purification of Organically Contaminated Sewage,
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Oil-Water Separation Process and Apparatus,
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Water Supply at Los Alamos During 1976,
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Removing Phenols Via Activated Carbon,
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LUND INST. OF TECH. (SWEDEN). DEPT. OF NUCLEAR PHYSICS.
Ambient Air Contamination by Micron and Submicron Particles from Welding Operations,
W78-01251 5A

M.M.M. ENGINEERING COLL., GORAKHPUR U.P. (INDIA), DEPT. OF CIVIL ENGINEERING.
An Experimental Study of Bluff Buoyant Turbulent Surface Jets,
W78-01633 8B

MASSACHUSETTS INST. OF TECH., CAMBRIDGE. DEPT. OF CIVIL ENGINEERING.
Leakage of Groundwater Through a Slot in a Sheet Pile,
W78-01632 8D

MCPHEE, SMITH, ROSENSTEIN ENGINEERS, BUFFALO, NY.
Industrial Waste and Pretreatment in the Buffalo Municipal System.
W78-01270 5D

MEDICAL ACADEMY, VARNA (BULGARIA).
Experimental Study of some Problems of the Biological Effect of Water Treated by a Constant Magnetic Field, (In Russian),
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MERIDEN SEWER AUTHORITY, CT.
Licking Operational Problems the Hard Way,
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METCALF AND EDDY, INC., DES PLAINES, IL.
Petroleum Processing Wastes, (Literature Review),
W78-01238 5D

MEXICAN WATER PLAN, MEXICO CITY. PHYSICAL RESOURCES AND WATER USES GROUP.
Present and Potential Land Use Mapping in Mexico,
W78-01603 4A

MICHIGAN STATE UNIV., EAST LANSING.
Improved Resource Use Decisions and Actions Through Remote Sensing,
W78-01599 6B

MICHIGAN STATE UNIV., HICKORY CORNERS. W. K. KELLOGG BIOLOGICAL STATION.
The Ecology of Running Waters: Theory and Practice,
W78-01530 6G

MINISTRY OF AGRICULTURE, TEL-AVIV (ISRAEL). SOIL CONSERVATION AND DRAINAGE DIV.
Rainfall Infiltration Into Bare Soils,
W78-01306 2G

MINNESOTA POLLUTION CONTROL AGENCY, ROSEVILLE.
Sampling and Analysis of Minnesota Tributaries and Municipal Point Sources to Lake Superior.
W78-01229 5B

MINNESOTA UNIV., DULUTH. DEPT. OF CHEMISTRY.
Chemical/Biological Implications of Using Chlorine and Ozone for Disinfection,
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MISSOURI UNIV., COLUMBIA. DEPT. OF CIVIL ENGINEERING.
Designing More Energy-Efficient Wastewater Treatment Plants,
W78-01448 5D

MONASH UNIV., CLAYTON (AUSTRALIA). GEOPHYSICAL FLUID DYNAMICS LAB.
Forced Plume Characteristics,
W78-01625 8B

MONTACHUSETT REGIONAL PLANNING COMMISSION, FITCHBURG, MA. 208 WATER QUALITY PLANNING PROGRAM.
Composting Industrial and Municipal Wastes Paper Mill and City Treatment Plant,
W78-01456 5E

MOSCOW STATE UNIV. (USSR). DEPT. OF GENERAL SOIL SCIENCE.
Experience in the Use of the Method of Microelectrical Vertical Soundings in Studying Irrigated Soil Evolution, (In Russian),
W78-01559 2F

MOSKOVSKAYA SEL'SKOKHOZYAISTVENNAYA AKADEMIYA (USSR). DIV. OF AGRICULTURE EXPERIMENT METHODS.
Soil Water System and Yield of Field Crops with Different Tillage Systems, (In Russian),
W78-01691 3F

NALCO CHEMICAL CO., OAK BROOK, IL. (ASSIGNEE).
Process for Reducing BOD in Food Processing Plant Wastes,
W78-01688 5D

NATIONAL ACADEMY OF SCIENCES AND NATIONAL RESEARCH COUNCIL, WASHINGTON, DC. NUMERICAL DATA ADVISORY BOARD.
Ad Hoc Advisory Panel on Evaluated Physical Property Data in Aid of Aqueous Environmental Problems.
W78-01654 5B

NATIONAL AERONAUTIC AND SPACE ADMINISTRATION, BAY ST. LOUIS, MS. EARTH RESOURCES LAB.
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, BAY ST. LOUIS, MS. EARTH RESOURCES LAB.
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, GREENBELT, MD. GODDARD SPACE FLIGHT CENTER.
Ocean Color Imagery- Coastal Zone Color Scanner,
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LANDSAT Digital Data Processing - A Near Real-Time Application,
W78-01613 7B

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, HOUSTON, TX. LYNDON B. JOHNSON SPACE CENTER.
Proceedings of the NASA Earth Resources Survey Symposium, June 1975, Technical Ses-

sion Presentations, Land Use-Marine Resources, Volume I-C.
W78-01589 7B

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, HUNTSVILLE, AL. GEORGE C. MARSHALL SPACE FLIGHT CENTER.
A Procedure Used for a Ground Truth Study of a Land Use Map of North Alabama Generated from LANDSAT Data,
W78-01651 7C

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, LANGLEY STATION, VA. LANGLEY RESEARCH CENTER.
Remotely Sensed and Laboratory Spectral Signatures of an Ocean-Dumped Acid Waste,
W78-01545 5A

Quantitative Suspended Sediment Mapping Using Aircraft Remotely Sensed Multispectral Data,
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Quantitative Mapping of Suspended Solids in Wastewater Sludge Plumes in the New York Bight Apex,
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NATIONAL CENTER FOR ATMOSPHERIC RESEARCH, BOULDER, CO.
Interpretation of Foil Impactor Impressions of Water and Ice Particles,
W78-01620 2B

NATIONAL COUNCIL OF THE PAPER INDUSTRY FOR AIR AND STREAM IMPROVEMENT INC., NEW YORK.
Paper and Allied Product, (Literature Review),
W78-01660 5D

NATIONAL ENFORCEMENT INVESTIGATIONS CENTER, DENVER, CO.
Evaluation of Sewage Treatment Facilities, San Francisco, California, September 1975.
W78-01409 5D

NATIONAL ENVIRONMENTAL RESEARCH CENTER, GROSSE LLE, MI. GROSSE LLE LAB.
Proceedings of the First Federal Conference on the Great Lakes, Held at Ann Arbor, Michigan, December 13-15, 1972.
W78-01351 5G

NATIONAL ENVIRONMENTAL SATELLITE SERVICE, WASHINGTON, DC.
Surface Circulation in the Great Lakes as Observed by LANDSAT-1 August 1972 to December 1973: Southern Lake Michigan,
W78-01609 2H

NATIONAL FIELD INVESTIGATIONS CENTER-DENVER, CO.
Report on Evaluation of Waste Sources in the Memphis, Tennessee Area.
W78-01282 5B

Report on Water Quality and Waste-Source Investigations-Missouri River and Papillion Creek, Omaha, Nebraska.
W78-01283 5B

NATIONAL MARINE FISHERIES SERVICE, MILFORD, CT. MILFORD LAB.
Short-term Effects of Two Silver Salts on Tissue Respiration and Enzyme Activity in the Cunner (Tautogolabrus Adspersus),
W78-01674 5C

NATIONAL MARINE FISHERIES SERVICE, SEATTLE, WA. NORTHWEST AND ALASKA FISHERIES CENTER.
Short-Term Thermal Resistance of Zoeae of 10 Species of Crabs from Puget Sound, Washington,
W78-01679 5C

Mercury in Fish and Shellfish of the Northeast Pacific. III. Spiny Dogfish, Squalus acanthlas,
W78-01683 5B

NATIONAL MARINE FISHERIES SERVICE, ST. PETERSBURG, FL. SOUTHEAST REGIONAL.
Alteration and Destruction of Estuaries Affecting Fishery Resources of the Gulf of Mexico,
W78-01663 5C

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, CO. MARINE ECOSYSTEMS ANALYSIS PROGRAM.
Recommendations for Microbiological Studies in the Continental Shelf Areas. Results from Two Workshops Convened 10-11 August 1976 and 19-20 October 1976 in Boulder, Colorado. Outer Continental Shelf Environmental Assessment Program.
W78-01274 5C

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, MIAMI, FL. ATLANTIC OCEANOGRAPHIC AND METEOROLOGICAL LABS.; NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, MIAMI, FL. SEA-AIR INTERACTION LAB.
A Comparison of Skylab S-193 and Aircraft Views of Surface Roughness and a Look Toward Seasat,
W78-01606 2L

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, PRINCETON, NJ. GEOPHYSICAL FLUID DYNAMICS LAB.
Simulation of the Tropical Climate of an Ice Age,
W78-01304 2A

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ROCKVILLE, MD.
International Field Year for the Great Lakes.
W78-01187 2H

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, SEATTLE, WA. PACIFIC MARINE ENVIRONMENTAL LAB.
Distribution and Composition of the Suspended Particulate Matter in the Waters of the DOMES Region,
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NATIONAL OCEANIC ATMOSPHERIC ADMINISTRATION, MIAMI, FL. ATLANTIC OCEANOGRAPHIC AND METEOROLOGICAL LABS.
Winter Intrusions of the Loop Current,
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NATIONAL OCEANIC ATMOSPHERIC ADMINISTRATION, SEATTLE, WA. PACIFIC MARINE ENVIRONMENTAL LAB.
A Comparison of Oceanic Precipitation as Measured by Gage and Assessed from Weather Reports,
W78-01656 2B

NATIONAL RESEARCH COUNCIL, WASHINGTON, DC. COMMITTEE ON RENEWABLE RESOURCES FOR INDUSTRIAL MATERIALS.
Extractives as a Renewable Resource for Industrial Materials.
W78-01549 3E

NATIONAL RESEARCH INST. FOR POLLUTION AND RESOURCES, TOKYO (JAPAN).
Chemico-Biological Interactions in Biological Purification System, I. Growth Inhibition Effect of Azo Compounds on Activated Sludge Microorganisms,
W78-01266 5D

Chemico-Biological Interactions in Biological Purification System, II. Biodegradation of Azocompounds by Activated Sludge,
W78-01267 5D

NATIONAL SCIENCE FOUNDATION, WASHINGTON, DC.
Workshop on Nuclear Techniques for Environmental Trace Element Information Relative to Energy Production and Consumption, Florida State University, Tallahassee, June 23-26, 1974.
W78-01550 5A

NATIONAL SWEDISH ENVIRONMENT PROTECTION BOARD, STOCKHOLM. RESEARCH LAB.
The Growth and Year-Class Strength of Perch (Perca fluviatilis L.) in Some Baltic Archipelagoes, with Special Reference to Temperature,
W78-01662 5C

NAVAL UNDERSEA CENTER, SAN DIEGO, CA. DEPT. OF FLEET ENGINEERING.
Recent Progress in Polymer Drag Reduction,
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NAVORSINGSINSTITUUT GROND BESPROEIING, PRETORIA (SOUTH AFRICA).
Use of a Modified Balney-Criddle Formula to Calculate the Irrigation Requirements of Winter Wheat in the Areas Between 16 degrees 30' East and 30 degrees E., and Between 27 degrees South and 35 degrees S. (In Afrikaans),
W78-01342 2D

NEW HAMPSHIRE UNIV., DURHAM.
Field Studies on Benthic Communities in the New England Offshore Mining Environmental Study (NOMES),
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NEW MEXICO STATE UNIV., LAS CRUCES. DEPT. OF AGRONOMY.
Minimizing the Salt Burden of Pecos River Irrigation Drainage Water,
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NEW SOUTH WALES UNIV., KENSINGTON (AUSTRALIA). DEPT. OF THEORETICAL AND APPLIED MECHANICS.
Wind Stress and Roughness Length Over Breaking Waves,
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NIJMEGEN UNIV. (NETHERLANDS). DEPT. OF ANALYTICAL CHEMISTRY.
Time Series Analysis on Ammonia Concentration and Load Values of the River Rhine,
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NIJMEGEN UNIV. (NETHERLANDS). DEPT. OF MICROBIOLOGY.
Removal of Escherichia Coli in Wastewater by Activated Sludge,
W78-01454 5D

NIKITA STATE BOTANICAL GARDEN, YALTA (USSR).
Effect of Air Temperature and Soil Humidity on the Water Content in Generative Buds of

NIKITA STATE BOTANICAL GARDEN, YALTA (USSR).
Cherry and Cultivars with Different Levels of Frost Resistance (In Russian),
W78-01343 2I

NIPPON RISUI KAGAKU KENKYUSHO (JAPAN). (ASSIGNEE).
Process for Purifying Waste Water by Electrolysis,
W78-01212 5D

NORTH DAKOTA STATE UNIV., FARGO. DEPT. OF AGRICULTURAL ENGINEERING.
Runoff and Erosion Characteristics of Surface-Mined Sites in Western North Dakota,
W78-01298 2J

NORTHERN ILLINOIS UNIV., DEKALB. DEPT. OF BIOLOGICAL SCIENCES.
Concentration of Cadmium, Copper, Lead and Zinc in Six Species of Freshwater Clams,
W78-01675 5B

OCCIDENTAL RESEARCH CORP., LA VERNE, CA.
Silicate Scale Control in Geothermal Brines,
W78-01316 3A

ODESSA TECHNOLOGICAL INST. (USSR).
Chemical Composition of Seaweed in the Coastal Waters of the Black Sea (Ukrainian SSR), (In Russian),
W78-01560 2L

OHIO DEPT. OF ECONOMIC AND COMMUNITY DEVELOPMENT, COLUMBUS. DIV. OF COMMUNITY SERVICES.
Ohio's Statewide Land Use Inventory: An Operational Approach for Applying LANDSAT Data to State, Regional and Local Planning Programs,
W78-01591 4A

OHIO-KENTUCKY-INDIANA REGIONAL COUNCIL OF GOVERNMENTS, CINCINNATI, OH.
The Development of a Land Use Inventory for Regional Planning Using Satellite Imagery,
W78-01595 4A

OHIO STATE UNIV., COLUMBUS.
The Fishes of the Sandusky River System, Ohio,
W78-01527 5C

OHIO STATE UNIV., PUT-IN-BAY. CENTER FOR LAKE ERIE AREA RESEARCH.
Benthic Microinvertebrate Populations of Sandusky Bay,
W78-01531 5C

Abundance and Population Trends of Sandusky Bay Fishes,
W78-01532 5C

OKLAHOMA STATE UNIV., STILLWATER. BIOENVIRONMENTAL ENGINEERING LABS.
Formation of Strippable Metabolic Products in Biological Waste Treatment,
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OKLAHOMA STATE UNIV., STILLWATER. DEPT. OF AGRICULTURAL ENGINEERING.
Evaluating Components of the USDAHL Hydrology Model Applied to Grassland Watersheds,
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OKLAHOMA STATE UNIV., STILLWATER. DEPT. OF BIOENVIRONMENTAL ENGINEERING.
Functional Design of Activated Sludge Processes,
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OLD DOMINION UNIV., NORFOLK, VA. INST. OF OCEANOGRAPHY.
Hydraulic Sensor Instrumentation of a Shore Face in a Tidal Current Convergence Zone--Cape Henry, Virginia,
W78-01536 2L

ONTARIO MINISTRY OF THE ENVIRONMENT, REXDALE. LAB SERVICE BRANCH.
Extent of Effluent Influence on Lake Water Determined by Bacterial Population Distributions,
W78-01558 5B

ONTARIO MINISTRY OF THE ENVIRONMENT, REXDALE. WATER RESOURCES BRANCH.
Assessment of the Acute Toxicity, Growth Impairment, and Flesh-Tainting Potential of a Bleached Kraft Mill Effluent on Rainbow Trout (Salmo Gairdneri),
W78-01562 5C

ONTARIO MINISTRY OF THE ENVIRONMENT, TORONTO. POLLUTION CONTROL BRANCH.
Effect of Hole Size on Percoloation Rate in a Field Percolation Test,
W78-01312 2G

OPERATIONS RESEARCH, INC., SILVER SPRING, MD. SPACE AND COMMUNICATIONS SYSTEM DIV.
Concept Definition of the Army Environmental Technical Information System,
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OREGON STATE UNIV., CORVALLIS. SCHOOL OF OCEANOGRAPHY.
Bottom Nepheloid Layers and Bottom Mixed Layers Observed on the Continental Shelf Off Oregon,
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Groin Length and the Generation of Edge Waves,
W78-01538 8B

Changes Due to Jetties at Tillamook Bay, Oregon,
W78-01539 8B

OSLO UNIV. (NORWAY). INST. OF GEOPHYSICS.
A Note on Horizontal Gradients in Fjords,
W78-01638 2L

PENNSYLVANIA DEPT. OF TRANSPORTATION, HARRISBURG. BUREAU OF MATERIALS, TESTING AND RESEARCH.
Evaluation of Sediment Control Dams,
W78-01313 4D

POLYBAC CORP., NEW YORK.
Using Customized 'Bugs' for Biological Waste Treatment,
W78-01260 5D

PROGRESSIVE EQUIPMENT CORP., ERIE, PA. (ASSIGNEE).
Electrostatic Water Treatment System,
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PUBLIC HEALTH AND ENVIRONMENTAL PROTECTION (NETHERLANDS).
Pollution Control and Legislation--The Dutch Approach,
W78-01225 5G

PULP AND PAPER RESEARCH INST., POINT CLAIRE (QUEBEC).
Quality of Effluents from Mechanical Pulping Processes,
W78-01659 5D

PURDUE UNIV., LAFAYETTE, IN. DEPT. OF AGRICULTURAL ENGINEERING.
An Erosion Equation Derived from Basic Erosion Principles,
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A Runoff Erosivity Factor and Variable Slope Length Exponents for Soil Loss Estimates,
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RAYTHEON OCEANOGRAPHIC AND ENVIRONMENTAL SERVICES, PORTSMOUTH, RI.
Trace Metal Concentrations in Two Shellfish Species of Commercial Importance,
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RESOURCES FOR THE FUTURE, INC., WASHINGTON, DC.
Federal Water Resources Management: The Administrative Setting,
W78-01499 6E

ROORKEE UNIV. (INDIA), DEPT. OF CIVIL ENGINEERING.
Viscosity and Surface Tension Effects on Weir Flow,
W78-01286 8B

ROSENSTIEL SCHOOL OF MARINE AND ATMOSPHERIC SCIENCE, MIAMI, FL. DIV. OF MARINE GEOLOGY AND GEOPHYSICS.
Time Scales and Dynamic Models of Deep-Sea Sedimentation,
W78-01303 2L

SACHS-SYSTEMTECHNIK G.M.B.H., SCHWEINFURT (WEST GERMANY).
Method and Apparatus for Purifying Water Contaminated with Anodically Oxidizable Organic Matter,
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SAN JOSE STATE UNIV., CA. DEPT. OF METEOROLOGY.
The Microstructure of California Coastal Fog and Stratus,
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SCIENCE APPLICATIONS, INC., LA JOLLA, CA.
A Procedure for Estimation of Sea-Surface Temperature from Remote Measurements in the 10-13 Micrometer Spectral Region,
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SHAFER, KLINE AND WARREN, KANSAS CITY, MO.
'Piggy-Back' Sewer Solves Overload Problem,
W78-01425 8B

SHIMEK, ROMING, JACOBS, AND FINKLEA, DALLAS, TX.
Designing to Remove Phosphorus by Using Metal Salts and Polymers in Conventional Plants,
W78-01408 5D

SIBERIAN RESEARCH INST. OF THE FISH INDUSTRY, KRASNOYARSK (USSR). KRASNOYARSK DIV.
Benthic Fauna of Bodies of Water of the Lower Tunguska Basin, (In Russian),
W78-01586 2H

SMITH (S.) AND SON PTY. LTD., ANGASTON (AUSTRALIA).
Treating Winery Waste Using Aerobic Lagoons,
W78-01256 5D

SOCIETE CHIMIQUE DES CHARBONNAGES, PARIS (FRANCE). (ASSIGNEE).
Method of Removal of Petroleum Products from Solid or Liquid Surfaces,
W78-01209 5G

SOLVAY AND CIE, S.A., BRUSSELS (BELGIUM). CENTRAL LAB.
Biodegradation of Polymeric Builders--Experiments with a C-14 Labelled Sodium Poly(Alpha-Hydroxyacrylate),
W78-01477 5B

SOUTHERN ROCKINGHAM REGIONAL PLANNING DISTRICT COMMISSION, SALEM, NH.
Eutrophication: A Threat to New Hampshire's Lakes and Ponds - What Legal Tools are Available for Protection,
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SRI INTERNATIONAL, MENLO PARK, CA.
Energy Uses and Recovery in Sludge Disposal, Part 3,
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Optimizing Granular Media Filtration,
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STANLEY CONSULTANTS, INC., MUSCATINE, IA.
Water Supply and Treatment: State-of-the-Art.
W78-01572 5F

STATE ORGANIZATION OF SOILS AND LAND RECLAMATION, BAGHDAD (IRAQ).
Composition of Saline Drainage Water in Iraq and Its Use,
W78-01497 3C

STATE UNIV. OF NEW YORK AT STONY BROOK. MARINE SCIENCES RESEARCH CENTER.
Short-Term Water Column Perturbations Caused by Wastewater Sludge Dumping in the New York Bight Apex,
W78-01628 5B

STATE UNIV. OF NEW YORK AT SYRACUSE. COLL. OF ENVIRONMENTAL SCIENCE AND FORESTRY.
Conversion of Sludges into 'Topsoils' by Earthworms,
W78-01469 5E

STATENS FORSOEGSMEJERI, HILLEROD (DENMARK).
Waste Treatment in the Danish Dairy Industry,
W78-01255 5D

SULZER BROS. LTD., WINTERTHUR (SWITZERLAND).
New Aspects of Closed Processing Circuits in the Paper and Paperboard Industry,
W78-01565 5D

SYBRON CORP., ROCHESTER, NY. (ASSIGNEE).
Skimmer Apparatus for Sewage Settling Tanks and the Like,
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SYSTEMS ENGINEERING AND MFG., CORP., STOUGHTON, MA. (ASSIGNEE).
Wastewater Treatment,
W78-01698 5D

TAIWAN SUGAR RESEARCH INST., TAIWAN.
Treatment of Concentrated Yeast Waste,
W78-01257 5D

TANZANIA NATIONAL SCIENTIFIC RESEARCH COUNCIL, DAR ES SALAAM.
Compost Latrines in Tanzania: A Preliminary Report,
W78-01457 5E

TEXAS A AND M UNIV. COLLEGE STATION.
Three Examples of Applied Remote Sensing of Vegetation,
W78-01602 7C

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF OCEANOGRAPHY.
Phytoplankton and Primary Productivity Studies; Preliminary Report,
W78-01278 5C

TEXAS A AND M UNIV., OVERTON. AGRICULTURAL RESEARCH AND EXTENSION CENTER.
Precision with Which Selected Soil Physical Parameters can be Estimated,
W78-01302 2G

TEXAS UNIV. AT AUSTIN. DEPT. OF CIVIL ENGINEERING.
Application of Oxygen to Treat Waste from Military Field Installations,
W78-01402 5D

TEXAS UNIV. AT AUSTIN. DEPT. OF GEOLOGICAL SCIENCES.
Adjustment to Quaternary Climatic Change by the Colorado River in Central Texas,
W78-01504 2E

TEXAS UNIV. HEALTH SCIENCE CENTER AT HOUSTON. SCHOOL OF PUBLIC HEALTH.
Bacterial Relationships in Stormwaters,
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THIOKOL CORP., NEWTOWN, PA. (ASSIGNEE).
Treatment of Water Containing Cyanide,
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THYSSEN PLASTIK ANGER K.G., MUNICH (WEST GERMANY).
Apparatus and Process for Drawing Water from a Water-Bearing Strata,
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TII CORP., LINDENHURST, NY. (ASSIGNEE).
System for Pollution Suppression,
W78-01488 5D

TOTTORI UNIV. (JAPAN). FACULTY OF AGRICULTURE.
Studies on the Fixation of Drifting Sand: 3. Relation Between Sand Surface Moisture Content and Drifting Sand, (In Japanese),
W78-01585 2L

TRW, INC., REDONDO BEACH, CA. (ASSIGNEE).
Dynamic Positioning System for a Vessel Containing an Ocean Thermal Energy Conversion System,
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TSENTRALNYI NAUCHNO-ISSLEDOVATELSKII INST. BUMAGI, MOSCOW USSR.
Utilization of Pulp and Paper Industry Wastes (Utilizatsiya otkhodov tsellyulozno-bumazhnogo proizvodstva),
W78-01271 5D

UKRAINIAN RESEARCH INST. OF AGROCHEMISTRY AND SOIL SCIENCE, KHARKOV (USSR).
Changes in Biochemical and Water-Physical Properties of Soils Irrigated with Mineralized Water (In Russian),
W78-01293 2G

Water Regime of a Typical Thick Chernozem of the (Dnieper River) Left-Band Forest-Steppe Zone of the Ukrainian SSR (In Russian),
W78-01346 2G

UMEA UNIV. (SWEDEN). DEPT. OF BIOLOGY.
Ecological Effects of Heavy Metal Discharge in a Salmon River,
W78-01661 5C

UNION CARBIDE CORP., NEW YORK. (ASSIGNEE).
Separation of Liquid Phases,
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UNION CARBIDE CORP., TUXEDO, NY.
Reverse Osmosis and Ultrafiltration of Oily and Pulping Effluents,
W78-01237 5D

UNITED STATES STEEL CORP., CHICAGO, IL. POWER DIV.
U. S. Steel's South Works Process Water Recycle System,
W78-01254 5D

UNIVERSIDADE FEDERAL DE PERNAMBUCO, RECIFE (BRAZIL). INST. OF BIOLOGICAL SCIENCES.
Algologic and Chemical-Bacteriologic Study of the Water of the Reservoir of the Public Promenade of Curitiba, State of Parana, Brazil: I. Genera of Microscopic Algae (In Portuguese),
W78-01198 5C

UNIVERSITY OF EAST ANGLIA, NORWICH (ENGLAND). SCHOOL OF ENVIRONMENTAL SCIENCES.
Diffuse Flow and Conduit Flow in Limestone Terrain in the Mendip Hills, Somerset (Great Britain),
W78-01288 2F

Carbon Dioxide in the Atmosphere of the Unsaturated Zone: An Important Control of Groundwater Hardness in Limestones,
W78-01289 2F

UTAH STATE UNIV., LOGAN.
Electroplating and Cyanide Wastes, (Literature Review),
W78-01262 5D

UTSUNOMIYA UNIV. (JAPAN). COLL. OF AGRICULTURE.
Studies on the Soil-Water System in the Field: III. Desorption Curve Equation, (In Japanese),
W78-01575 2G

VICTORIA UNIV. (BRITISH COLUMBIA). DEPT. OF CHEMISTRY.
Physical Characterization and Microbiological Settling-Rate Modification of Aqueous Suspensions from Hot-Water-Process Oil-Sands Extraction,
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Effect of Chemical Agents on Settling Rates of Sludges from Effluent of Hot-Water Extraction of Athabasca Oil Sands,
W78-01234 5D

VIRGINIA POLYTECHNIC INST. AND STATE UNIV. BLACKSBURG.
The Use of Underwater Equipment in Freshwater Research.
W78-01537 7B

VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG. DEPT. OF CIVIL ENGINEERING.
Kinetics and Stoichiometry of Completely Mixed Activated Sludge,
W78-01482 5D

VIRGINIA UNIV., CHARLOTTESVILLE.
Simulation Model of Erosion and Deposition on a Barchan Dune,
W78-01645 2L

VSESOYUZNYI NAUCHNO-ISSLEDOVATELSKII INST. GIDROTEKHNIKI I MELIORATSII, MOSCOW (USSR).
Movement of Salts with Pellicular Water in Soils, (In Russian),
W78-01228 2G

VSESOYUZNYI NAUCHNO-ISSLEDOVATELSKII INST. KHLOPKOVODSTVA. LENINGRAD (USSR).
Water and Physical Properties of Soil and Cotton Yields Depending on Different Methods of Basic Tillage, (In Russian),
W78-01227 2G

WASHINGTON UNIV., SEATTLE.
Development of User Applications for Earth Resources Survey Data in Urban and Regional Planning in the Puget Sound Area,
W78-01600 4A

WASHINGTON UNIV., SEATTLE. DEPT. OF OCEANOGRAPHY.
Some Aspects of Puget Sound's Circulation and Water Properties,
W78-01273 2L

On a Differentially Heated Saltwater-Ice System,
W78-01624 2L

Puget Sound Interim Studies, Acoustic and Net Surveys of Fishes and Zooplankton,
W78-01670 8I

WASHINGTON UNIV., SEATTLE. SEA GRANT PROGRAM.
Coastal Resource Use - Decisions on Puget Sound,
W78-01355 6G

WATER POLLUTION CONTROL DIRECTORATE, EDMONTON (ALBERTA).
Steel Industry Wastes, (Literature Review),
W78-01249 5D

WATER POLLUTION CONTROL DIV., PHILADELPHIA, PA.
New 'Philadelphia Story' Being Written by Pollution Control Division,
W78-01452 5D

WATER RESOURCES COUNCIL, WASHINGTON, DC.
Water Resource Policy Study.
W78-01349 5G

WATERLOOPKUNDIG LAB., DELFT (NETHERLANDS).
Local Scour Around Cylindrical Piers,
W78-01300 8B

WILLIAMS COLL. WILLIAMSTOWN, MA.
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